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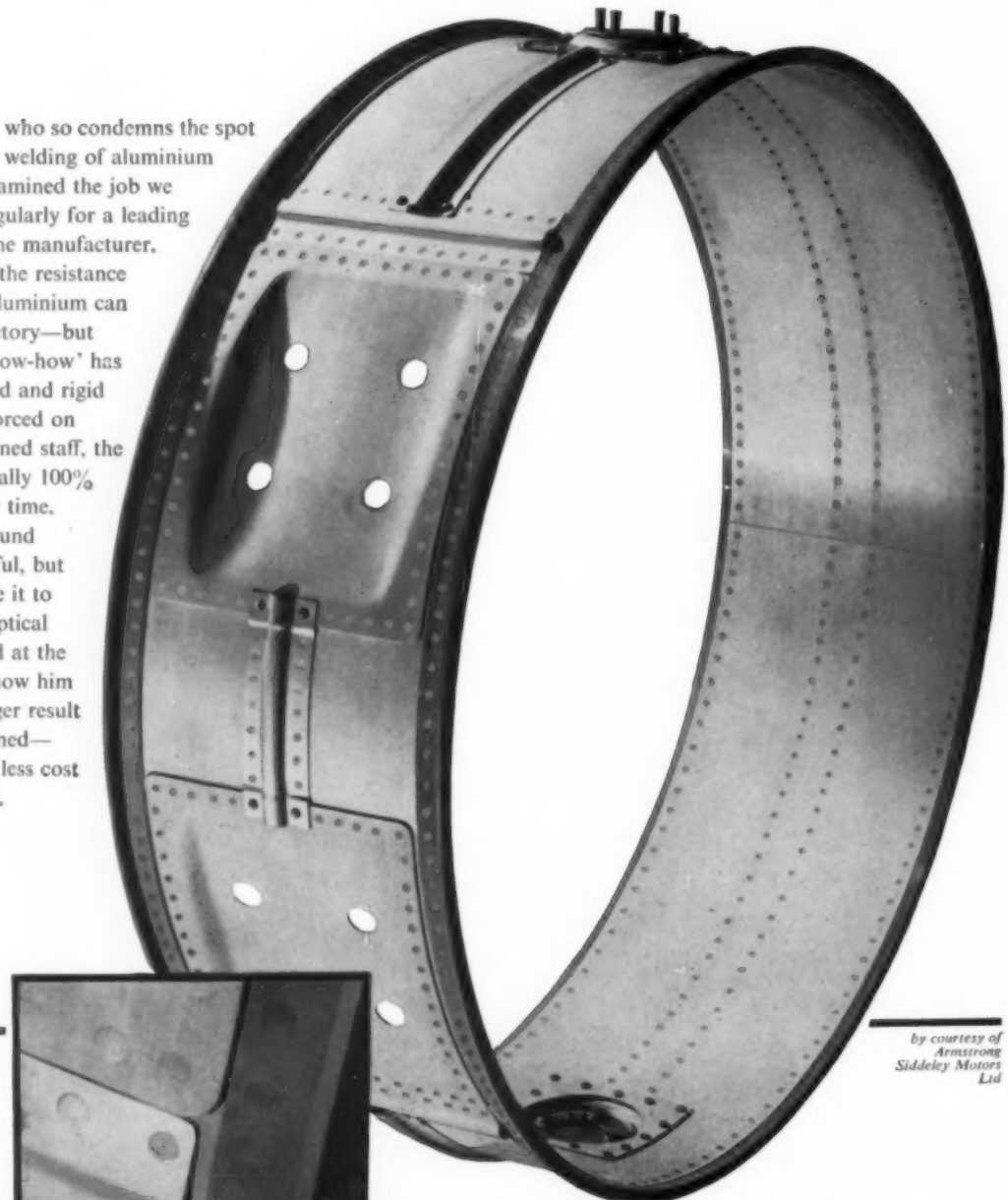
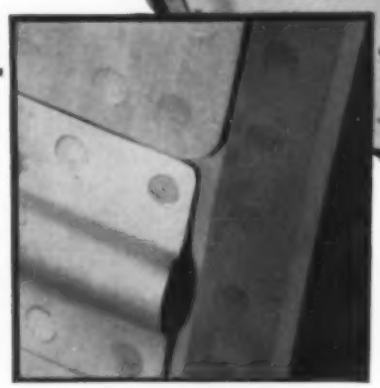


by courtesy of Armstrong Siddeley Motors Ltd



Detail on left shows the variety of metals successfully welded in the above unit; there being a non-heat treatable light alloy, two components of different heat treatable light alloys, all welded to centri-spun light alloy casting

✻

Middleton gets metals together

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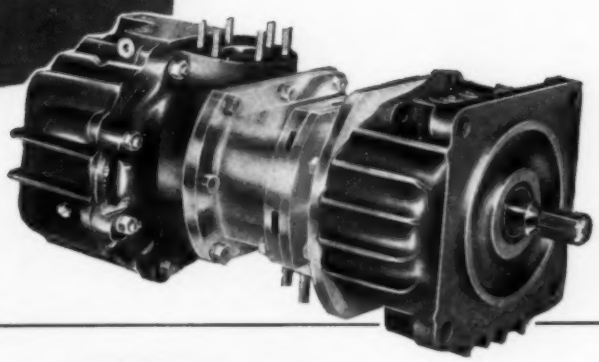
ESPECIALLY ALUMINIUM

THE MIDDLETON SHEET METAL COMPANY LTD., SPRINGVALE WORKS, MIDDLETON, MANCHESTER

pp2

What's new?



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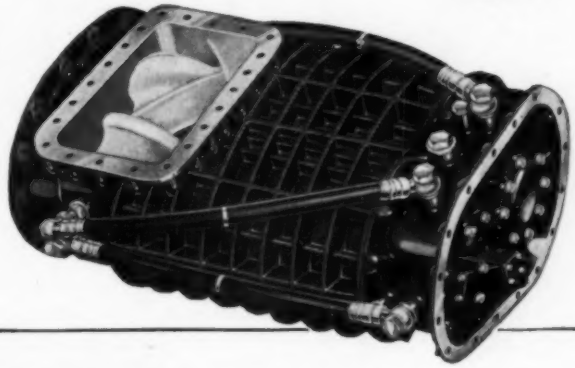

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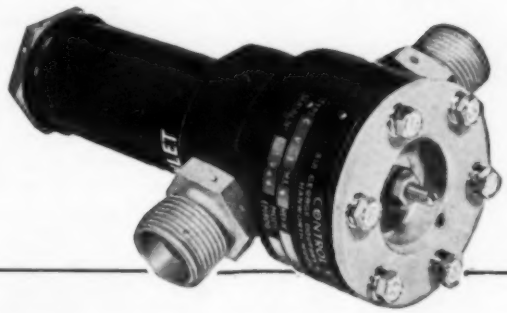

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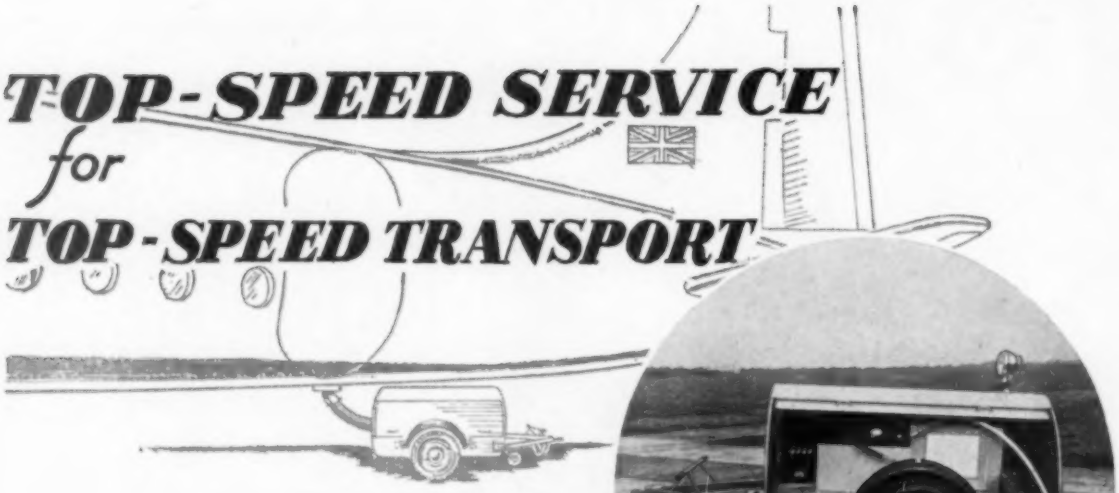

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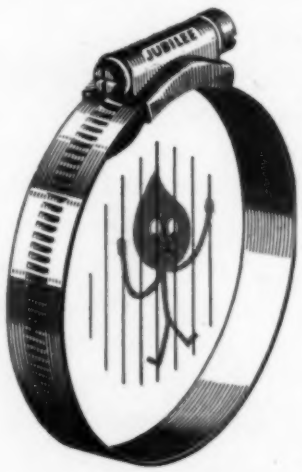

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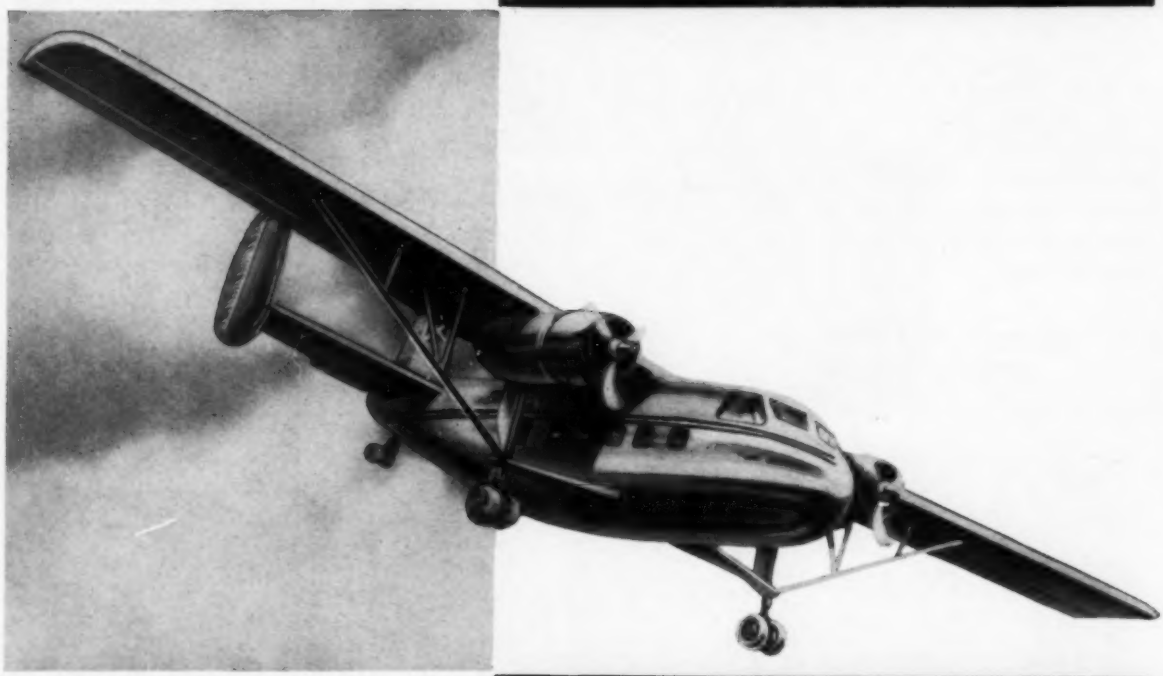

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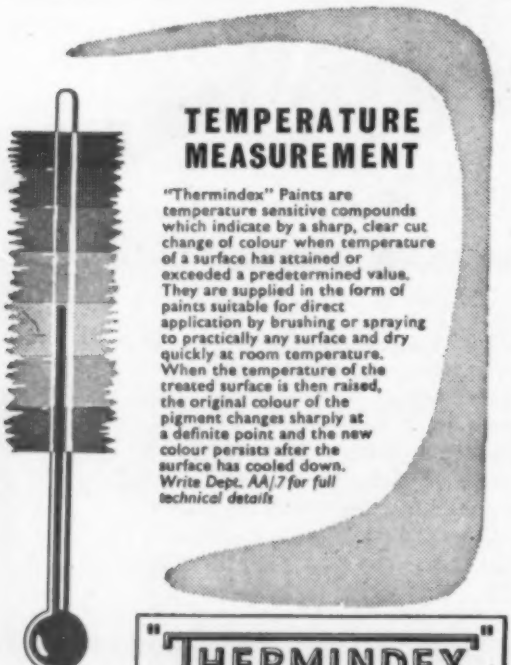

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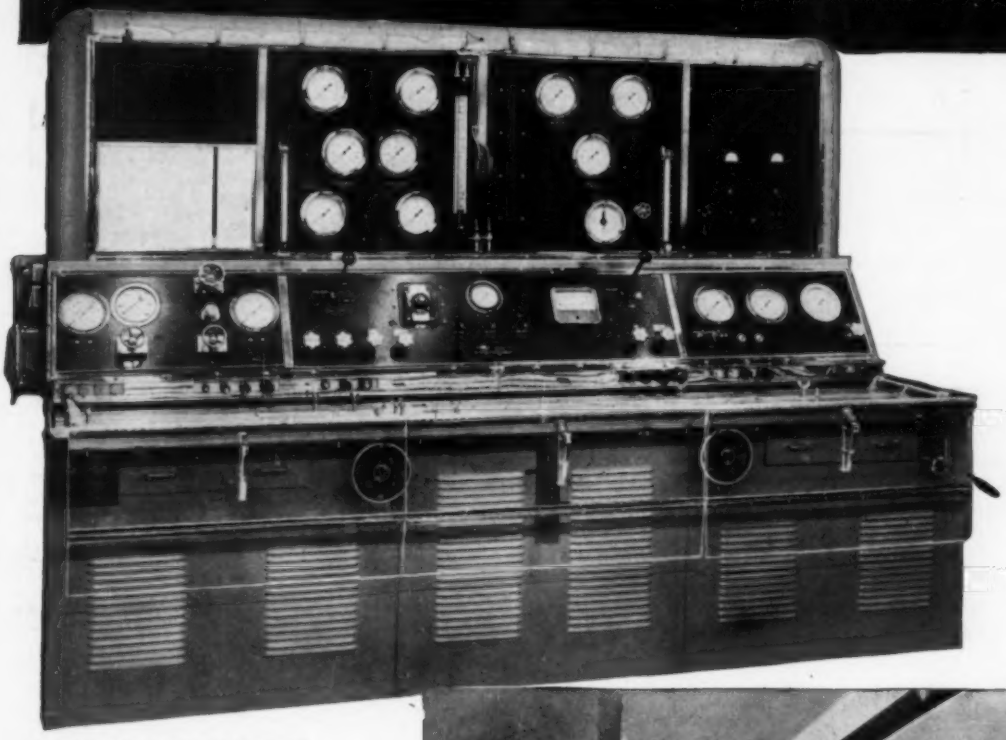
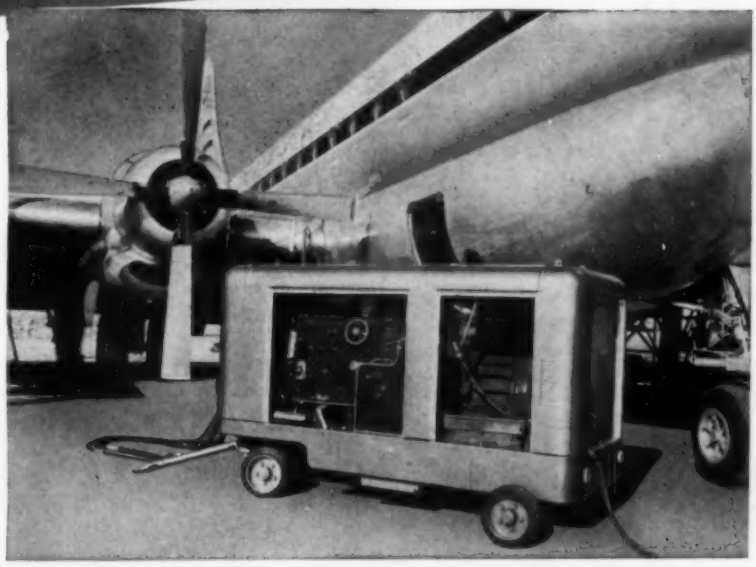


The HML Mark I Universal Hydrostatic Test Rig for all aircraft components.



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FLIGHT
and
AIRCRAFT ENGINEER No 2490 Vol 70 FRIDAY 12 OCTOBER 1956

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Signing up a Star

ACROSS a not-so-azure main there flashed last week some heartening news of Britannia, the lady who promises to touch American hearts and billfolds with all the charm and success of Miss Diana Dors herself. The New World talent scouts, of course, have had their eye on this British beauty since her coming-out in 1952; and on her first American tour, under the management of the shrewd and enterprising Peter Masefield, she endeared herself as much by the incomparable modulation of her voice as by her Junoesque loveliness of form (not to mention her homely, though wholly becoming, virtue of thrift).

How wretched, then, that the premature announcement of her first American contract should have so incensed Northeast Airlines, Inc., her new sponsors, that they should have postponed the signing out of hand, and with what unanimity right-thinking citizens acclaimed impresario Masefield in his public denunciation of the culprit as an ass.

Happily there is good reason to hope that, when this is read, harmony will have been quite restored. That the contract will be a felicitous piece of business for Mr. G. E. Gardner, president of Northeast, is clear from a reported statement. "We found ourselves in the happy position," he said, "of wanting the world's foremost turbo-propeller airliner, and finding it available two or three years ahead of any comparable American-made aeroplane." On every count, he added, the Britannia rated "tops" in comparison with other present-day transport aircraft.

There we have the considered opinion of an evaluation team of engineering and operating executives which the Northeast chief had sent to Bristol; and though that assessment could hardly be refuted, we must nevertheless acclaim the generosity of the terms in which Mr. Gardner made his declaration.

There are those, of course, in this country as well as in the U.S.A., who would lose no time in pointing out that these are the words of a man who has contracted to buy new equipment and who finds himself faced with the job of selling it to a fickle public. That is right enough; but Mr. Gardner's golden opinion has had the enthusiastic support of other American officials and engineers in public and private comment. We recall, too, that when apprised of the rigorous schedule for the Britannia's American tour several airline executives expressed dubiety, if not downright disbelief. In the event, of course, the Britannia conducted herself like the lady she is, and Eddie Rickenbacker, the case-hardened president of Eastern Airlines, had to admit that to complete without serious snag a 24,000-mile trip (taking in New York, San Diego, Los Angeles, Vancouver, San Francisco, Denver, Chicago, Miami, Washington, Ottawa and Montreal) would have tried one of his somewhat démodé Hollywood queens.

Alarm in the Tower

FOR its sheer intricacy air traffic control might be likened to a game of three-dimensional chess, in which there are but a few seconds for contemplation of the moves. The players are the traffic control officers, and as the rules of the game have increased in complexity they have been feeling more and more disturbed about the impending stalemate.

The British players put their feelings into words last week (as recorded on page 620) at the first convention of the Guild of Air Traffic Control Officers. Their report, coming as it did from the men who are nearest to the problem, should leave no doubts about the perilously inadequate state of the United Kingdom's air traffic control system. The report is not mere gloom-mongery: it is wisdom before the event—the sort of tragic event which, in the U.S.A., has resulted in "national emergency" measures for the improvement of that country's A.T.C. system.

A good deal of choking undergrowth needs clearing away before the root of the problem—the conflicting interests of military and civil aircraft—can be tackled. But the Guild's report contains solid proposals which could be developed forthwith. They would lead to the obviously inevitable joint military and civil control of Britain's air space—a Trinity House of the air.

FROM ALL QUARTERS

A.W. 650/651

NEW information from Coventry about Armstrong Whitworth's promising new Freighter/Coach reveals that two distinct versions of the aircraft will be offered—a twin-engined short-fuselage design designated A.W.650 and an alternative four-Dart-powered version, with an extended fuselage, that will bear the type-number A.W.651.

Both designs are of twin-boom layout, with pressurized fuselage and "full-width fore and aft axial doors," but an unpressurized fuselage of exceptional width can be provided for the car-ferry rôle. The "open-ended" arrangement and the choice of power-plant and fuselage length are intended to provide the prospective civil or military operator with alternatives from which the optimum payload and range can be selected. The short-range payload of the twin-engined version will be about 25,000 lb, and the four-engined, extended fuselage version will carry a payload of 30,000 lb—considerably more than appeared likely from the preliminary details upon which our report last week was based. As a result of A.W.A.'s extensive market research (which although not yet complete, shows the need for a highly-flexible, medium-range aircraft of this sort), considerable effort has been made to make the field of application as wide as possible, and the A.W.A.650/651 is visualized as a military transport, civil freighter, car ferry or air-coach. In the 66-passenger variant the seats are arranged six-abreast across the wide floor. Since the ability to uplift passengers may be of considerable value to an operator with all-freight services, careful consideration has also been given to easy conversion of the aircraft from an all-passenger to a mixed passenger and cargo rôle.

The large loading doors at each end of the fuselage give unrestricted access to a fuselage cross-section carefully chosen to accommodate maximum cargo volume and a wide, level, unobstructed floor upon which high density loads can be carried.

Operating stage-lengths of up to 2,000 n.m. are envisaged at cruising speeds quoted by A.W.A. as being between 300 and 350 m.p.h. Some variation in performance between the two- and four-engined versions can obviously be expected. The take-off weight in the various rôles varies between 70,000 lb and 80,000 lb, which is not high for the thrust that will be available. The "special attention" which had been paid to take-off and landing distances—another important consideration in ensuring maximum application—includes the use of double-slotted flaps and a moderate wing loading.

Dutch Order Hunter T.7s

IT was announced last week that the Dutch Ministry of War had placed an order for ten Hawker Hunter T.7 dual-control trainers for the Royal Netherlands Air Force, and that a further ten would probably be ordered at a later date.

This is the first overseas order for the two-seat Hunter and it brings the total value of Hunter exports to £126m—greater than for any other British type of aircraft. It is relevant to note that Hunters are already in production in Holland and Belgium and are standard day fighters with the air forces of both countries. Swept-wing conversion and transonic tuition will be standard procedures with the T.7, but cannot be carried out on the indigenous Fokker S.14 Mach-Trainer. The Hunter T.7 is already in production for the R.A.F.

LIVING UP TO ITS NAME: Conversion of the D.H. Otter to an Edo-float-equipped amphibian follows a precedent successfully established with the Beaver. The mainwheels retract into wells and the nosewheel rotates through 270 deg to lie in the deck of the float.

ULTRA-LIGHT EVOLUTION: Fairey's Ultra-Light helicopter is undergoing intensive development at White Waltham. This new view shows it with a partly "solid" tail boom and an extra pitot head on the port skid. Fully powered controls have given excellent results.

Gen. Kammhuber with the R.A.F.

AT the invitation of the Chief of the Air Staff, Air Chief Marshal Sir Dermot Boyle, Lt-Gen. J. Kammhuber, Head of the Air Force of the German Federal Republic, has been visiting Britain this week. Gen. Kammhuber was accompanied by Col. J. Steinhoff, Col. A. Hentz, Lt-Col. W. M. Horten, Lt-Col. W. Leuchtenberg and Lt-Col. H. Merkwitz.

The party's programme included discussions with the Air Ministry on matters affecting future co-operation between the two air forces within the framework of NATO, with particular reference to mutual problems of air defence; a visit to Fighter Command, and talks with the A.O.C-in-C., Air Marshal Sir Thomas Pike; and visits to certain firms in the industry. The general was also to fly a Hunter T.7 at West Raynham last Tuesday.

Fighter into Missile

THE ultimate development of the Trident mixed-power interceptor fighter of France's Ouest-Aviation is now known to be a long-range ground-to-air missile. The first pilotless, guided version is due to fly shortly, and various types of strategic missiles with a "completely new navigation system" are already under development.

Javelins—and after

WRITING in the Gloster house magazine, Eric Greenwood, the company's technical sales manager, describes the Javelin order as the largest the British industry has on its books at the moment. The design office, he says, is improving the aircraft almost daily, as it did the Meteor, and the company hopes that it will meet with a like success.

"We were all disappointed," writes Mr. Greenwood, "when the Javelin's successor, together with several other development contracts in the rest of the aircraft industry, was rejected. However, money must be saved to balance the country's economy, and defence is having to shoulder a heavy burden. The Air Minister apparently considered that expense can be saved on orthodox aircraft in order that we may spend money on future and more effective weapon projects which will appear in several years' time, and Glosters have every reason to believe that they will be in the picture when these new weapons are adopted."

Cansos to Australia and Antarctica

THREE Canso aircraft operated by two companies of the Canadian Hunting group left Toronto towards the end of last month to carry out photographic and geophysical survey work in the Falkland Islands, the Antarctic and Australasia. They comprised two machines of the Photographic Survey Corporation which are to complete aerial surveys for the British Government in the Falkland Islands and the Antarctic; and CF-GKI, which is being sent by Aeromagnetic Surveys, Ltd., to pioneer aerial geophysics in Australasia with Adastra Hunting Geophysics Pty., Ltd., of Sydney, N.S.W. This particular machine, which has been responsible for discovering many mineral deposits across Canada, is fitted with a triple installation comprising electromagnetic detector, magnetometer, and scintillation counter. One of the two Antarctic Cansos was the one which carried out similar work during the British Antarctic Expedition last winter; the crews of these two aircraft are from P.S.C. and its English associate, Hunting Aerosurveys, Ltd.

STABLE OF HUNTERS: Seen at the gallop are the five newest variants of the Hawker Hunter, all of which were on view at the recent S.B.A.C. Display. From right to left, they are the F.4 modified to carry Fairey Fireflash guided missiles; the T.7 trainer; the converted F.6 attack-development aircraft with tip tanks; another F.6 with four 100-gal tanks; and, finally, a third F.6 with two auxiliary tanks and twenty-four 3in rockets.

Michel Detroyat

ON October 5 M. Michel Detroyat, well known between the wars as a test- and stunt-pilot, died in a Paris clinic, aged 51. In 1927 he escorted Lindbergh, after the latter's Atlantic flight, on a triumphal tour of airports; and between 1928 and 1936, Detroyat won a number of air contests in France and America.

During the German occupation of France he served as an official pilot to the Vichy Government, for which he was sentenced to "national disgrace." He lived in exile in Argentina, serving as an adviser to the Argentine air force, but returned to France five years ago.

Australia's New Agricultural Aircraft

DESIGNED and built in only 16 months, the prototype of the Kingsford Smith PL-7 Tanker agricultural aircraft is now undergoing flight tests in Australia. Powered by a 400 h.p. Armstrong Siddeley Cheetah X engine, the machine incorporates twin tail-booms, a tricycle undercarriage and a 45 cu ft tank for top-dressing or crop-spraying chemicals. Responsible for the design and construction of the aircraft are, respectively, Mr. L. Pellarini and Kingsford Smith Aviation Service Pty., Ltd.

The unorthodox layout of the new machine is well illustrated in the photographs on this page. The forward section of the fuselage consists of a welded mild-steel tank forming a hopper and carrying all main loads. The forward face of the tank carries the engine-mounting frame and nosewheel boom; to the rear face is attached the rear-fuselage cone containing cockpit and fuel tank. The rear-fuselage section is fabricated from welded steel tubing, the lower half of the structure (which carries all loads) being stressed to 60 g.

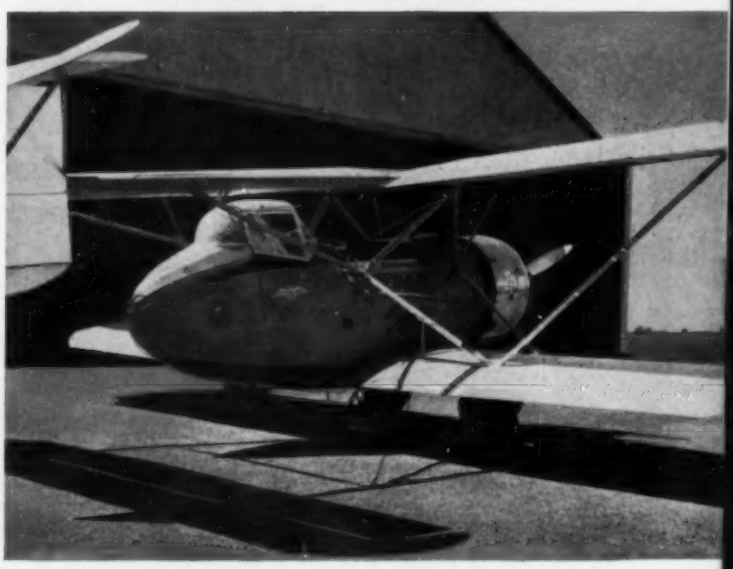
The lower mainplanes are of welded steel tube and fabric-covered construction, with detachable light-alloy leading-edge sections. Full-span copper spray-booms are built into the trailing edges, with provision for a large number of standard spray nozzles. Composite construction is employed for the upper mainplanes, and the ailerons are fully slotted. The upper planes, which are supported by a single lift-strut, are attached to a gulled centre-section (of similar construction) supported by streamlined struts.

Wheels, tyres and shock-absorber units of the non-retractable tricycle undercarriage are interchangeable throughout. Hydraulic brakes are fitted to the mainwheels and are operated by means of toe pedals. The nosewheel is directly steered by means of cables from the rudder pedals.

The fabric-covered steel tube tail unit is carried on two four-inch-diameter tubular steel booms projecting rearwards from the rear face of the centre-section spar and braced to the tank unit. Twin fins and rudders, across the top of which the tailplane is carried, are attached at their mid-points to the booms. The large horn-balanced elevator has dual trim-tabs and the rudders are also horn-balanced. All control cable-runs from cockpit to tail are carried externally along the booms and boom supports.

As mentioned, the power unit is the Armstrong Siddeley Cheetah X, delivering 400 h.p. for take-off through an all-metal, fixed-pitch Fairey Reed airscrew. A simple electric system is installed to provide engine starting and fuel-contents indication.

PL-7 Tanker (Armstrong Siddeley Cheetah X).—Span, 40.8ft (upper), 30ft (lower); length, 24.5ft; height, 12ft; wing area, 405 sq ft; undercarriage track, 11ft; empty weight, 2,230 lb; gross weight, 5,000 lb; wing loading at gross weight, 12.3lb/sq ft; fuel capacity, 50 Imp gal; max. hopper load with full fuel and pilot, 2,186 lb; hopper capacity, 45 cu ft.
Calculated Performance:—
Maximum speed (sea level), 127 m.p.h.; cruising speed (75 per cent power), 112 m.p.h.; operating speed (topdressing and spraying), 70-90 m.p.h.; service ceiling (fully loaded), 12,800ft; absolute ceiling (fully loaded) 13,800ft; rate of climb (pilot and full fuel), 2,180ft/min; rate of climb (fully loaded), 740ft/min; range (still air at 6,000ft), 360 miles; take-off distance to reach safety speed (fully loaded, still air), 277 yd; take-off distance to clear 50ft at safety speed (fully loaded, still air), 475 yd; landing distance from 50ft (hopper empty, still air), 140 yd; accelerate-stop distance (fully loaded, cutting engine at safety speed), 487 yd.



STRANGE BIRD from Down Under is the Kingsford Smith PL-7 Tanker, newly built—as described on this page—to meet agricultural needs.

BRISTOLIAN

IT is appropriate that the above title should be not only the name of our fastest—and perhaps best-kept—train but also applicable to our largest airliner. By any standard Bristol's Britannia—the 301 is illustrated—is a magnificent achievement; and it is being increasingly recognized as such by the world's airlines. In so competitive a business a piece of equipment either makes good or it does not; there are very few half-measures. With 60 firm sales—the latest order, for Northeast Airlines, is reported on p. 625—Bristol stand on the threshold of even bigger business, and are watching the tempo of interest quicken daily.

DECCA MARK 10

Latest Development in the Decca Navigator System

THE latest development in the range of Decca Navigator equipment is the Mark 10, which was first shown at the S.B.A.C. Show last month. A development of the Decca Navigator System, it is primarily intended to meet current and future air navigational needs in the most effective manner. For these applications it represents a significant advance over the existing system in terms of improved night-time coverage, simplified operation and minimum residual ambiguity of position fixing. The additional transmissions required from the ground stations are compatible with the present system and will in no way affect operation of existing receivers.

The improved performance of the Mark 10 system largely derives from a modified transmission method requiring a short burst of all four normal Decca frequencies, which are harmonically related in the ratio 5f, 6f, 8f and 9f from each station in turn, together with a new frequency, 8.2f, for zone identification purposes. The normal fine patterns are produced by transmission of the 5f, 6f, 8f and 9f signals from Purple, Master, Red and Green stations during the remainder of the operating cycle.

Though the present simultaneous transmissions of two signals from each of master and slave stations for identification of the lanes of the pattern on the base-line between them will be retained on the present basis, the separate transmission of a burst of four frequencies from each station enables a new system of lane identification employing a synthesised pulse to be implemented with considerable advantage.

It can be shown that individual variations in phase of the four component frequencies forming the pulse will, within normal operating limits, give rise to amplitude variation in the resultant pulse signal, with the result that a pulse amplitude gate may be employed to discriminate between valid and false lane identification conditions; and the permitted ratio of reflected skywave to groundwave signals for safe lane identification has been increased. As a result of this increased skywave tolerance, the operating range for lane identification should extend at night to a distance equal to that for effective normal pattern operation, while the use of the pulse-limiter technique enables automatic lane identification to be employed. False indicators are rejected, the Decometer pointers adjusting themselves to the correct settings upon reception of the first lane identification sequences and being checked thereafter by succeeding sequences.

The high accuracy inherent in the Decca Navigator System is obtained by accepting multiple ambiguities in the fine pattern position fix, and resolving them by lane identification to reduce the residual ambiguity to an average (dependent on base line length) of some 10 to 18 deg of position-line azimuth. The introduction of an additional 8.2f signal in the Decca transmission plan, producing, in conjunction with the 8f transmission, a 0.2f pattern, now provides a further five times reduction, giving a final ambiguity averaging 50 to 90 deg of position-line azimuth.

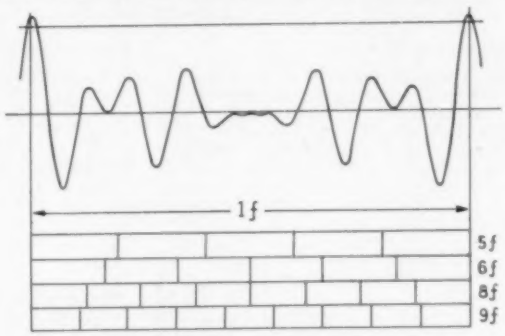
By the use of the superheterodyne principle in the receiver, operation on up to 21 Decca chain frequency groups is facilitated while still retaining the simple chain switching that is a feature of current Decca receivers. A second advantage of the superheterodyne method lies in the fact that this increased frequency coverage can be provided with approximately one-quarter the number of quartz crystal filters that are required for nine-chain operation in the current type of receiver: this reduction in space occupied by the crystals permits the use of a thermostatically-controlled housing and the improved phase stability thus obtained makes it unnecessary to reference or adjust the phase-characteristics of individual receiver channels during receiver operation.

To improve lane identification at long ranges, Mark 10 Decca employs the synthesised pulse technique mentioned above. Harmonics of the pulse recurrence frequency, widely separated in frequency, are separately received and then combined to produce a pulse stated to have characteristics much better than can be obtained by conventional methods within the maximum pass-band practicable at the transmitted frequencies.

Essentially, the Mark 10 identification method is similar to that of the existing system, a coarse 1f pattern being effectively superimposed on each of the three fine patterns in turn, embracing 24, 18 and 30 lanes in the Red, Green and Purple patterns respectively. The 1f pattern is, however, generated by successive transmissions of a burst of all four frequencies 5f, 6f, 8f and 9f from each station in turn, transmissions from the other three stations being suppressed at these times. The information provided by each transmission is effectively stored in the receiver to permit phase comparison. The additional frequency of 8.2f is of no consequence here, but is necessary for zone identification.

The four lane identification frequencies are carefully phased at the transmitter and the resultant waveform appears as shown in the diagram. It will be seen that the required 1f sub-harmonic is very clearly defined by the large peaks at this recurrence frequency. In the ideal case, if the four signals are received *via* separate A.G.C. controlled channels, any amplitude variations in the individual components will be corrected and this waveform may be reconstituted in the receiver. Furthermore, considerable phase deviation of the individual signals can be allowed before any other false peak of comparable amplitude will appear in the receiver waveform. While the amplitude of the wanted peak will fall, no false peak can rise to an equal amplitude level under any conditions with skywave/groundwave ratios of up to 44 per cent. An amplitude gate can therefore be set to accept the greater signal only and will pass either the wanted 1f component in the form of a short pulse or no signal at all.

Not only does the relaxation of skywave/groundwave ratio limit extend the expected range of lane identification to that at which skywave effects tend to make the fine patterns unacceptable for normal applications (the approved night-time range of the system is 240 nautical miles), but the use of the pulse-limiter technique also provides continuous discrimination against false lane identification within that range. This factor is very important from the user's point of view, as it permits the inclusion



The Mark 10 Decca lane identification pulse.

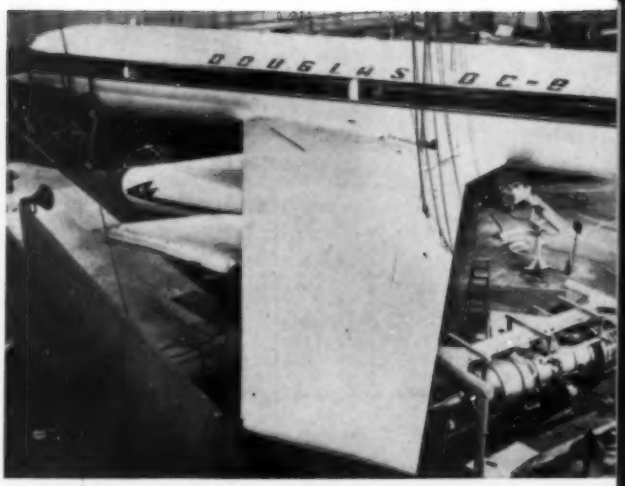
of circuits in the receiver to correct automatically the Decometer readings to the right position within a zone, providing the reduction in residual ambiguity given by the existing system without recourse to any manual adjustment.

With the inclusion of an 8.2f component in the lane identification signals, when a 0.2f pattern is generated together with the 8ft component, a further five times reduction is, of course, made in the residual ambiguity of the system. As this pattern is generated by two frequencies only, the tolerance to skywave effects is lower than that of the lane identification system. Zone identification is therefore not made fully automatic, the indications being brought up in succession for Red, Green and Purple patterns to permit checking and, if necessary, manual correction.

The continuously operating zone indicator at the base of the Decometer dial is coupled to a sector-shaped pointer mounted concentrically with the lane pointer and performing one revolution per five zones. The zone identification indication is given by the lane pointer, the drive mechanism being automatically switched to perform this secondary function upon reception of the appropriate lane/zone identification signal. Correct zone indication is shown by the lane pointer falling within the zone pointer sector during identification; and an error in the zone indicator setting results in a displacement of the sector-shaped pointer from the lane pointer position by 72 deg or a multiple of 72 deg. Correction can be made for such errors by means of the resetting button on the Decometer, which rotates the zone indicator and pointer in one-zone steps. This is the only operating adjustment required apart from initial setting-up of the Flight Log, when the latter forms part of the Mark 10 installation.

Zone identification provides unambiguous position-fixing within a group of five zones. Physically, this area will vary with the length of baseline (i.e. the number of zones in the pattern) and the bearing with respect to that baseline. But an average on entering the Decca coverage is of the order of 60 to 90 deg of position-line azimuth referred to the centre-point of that baseline, the higher figure applying, for example, to the existing English Decca Chain.

HERE AND THERE



MOCK JET: This picture of the DC-8 mock-up at Santa Monica shows the comely shape of the Douglas jet transport—until now the subject only of drawings and artists' impressions—in a new perspective. The P. and W. turbojet is also a mock-up.

Orpheus at High Thrust

A BRISTOL Orpheus turbojet is reported to have been run on the test-bed at a thrust of 7,380 lb, with afterburner.

Jindiviks for Sweden

IT was disclosed by the Swedish Air Force staff in Stockholm recently that Sweden is is buying Jindivik target aircraft from Australia.

F-86s for Spain

IT is reported from Spain that thirteen new F-86s were handed over to the Spanish Air Force at Getafe airfield on Saturday last, in the presence of the U.S. Ambassador and high-ranking Spanish Air Force officers.

Air-minded Ark

IN a broadcast talk last Sunday describing ten objects he would put into an imaginary Ark as representative of the 1950's, Mr. Charles Gibbs-Smith, the aeronautical historian, included the Britannia—"one of the most beautiful aeroplanes ever built."

Back to Form

ON Tuesday, October 2, S/L. Neville Duke made his first flight since he was grounded about four months ago with "slipped-disc" trouble. Taking off from Dunsfold in a Hunter and wearing a plaster jacket to prevent aggravation of his back injury, S/L. Duke flew for an hour, climbing to 48,000ft and attaining supersonic speed.

No Tortoise

ACCORDING to a report from New York the new U.S. research missile, the *Terrapin*, designed to obtain information for the proposed U.S. earth satellite, reached a height of 80 miles on its first test recently. A two-stage missile, less than 15ft long and weighing 224 lb, it attained a maximum speed of 3,800 m.p.h. during its 5.6 min flight.

French at English Electric

A GROUP of guided weapons specialists from the French Ministry of National Defence and the French Navy, Army and Air Force visited the English Electric Guided Weapons Division at Luton and Stevenage on September 27. They were shown how the English Electric weapon system operates, saw films of missiles being tested and later inspected facilities for the design, development and production of guided weapons.

Sir R. Fairey Memorial Service

NEXT Friday, October 19, a memorial service for Sir Richard Fairey will be held at St. Martin-in-the-Fields at 12 noon. Lord Brabazon of Tara will give the address.

Herculean Contract

A NEW order worth £36 million has been placed by the U.S. Air Force with the Lockheed Corporation for Hercules C-130 transports.

Research Unlimited

THE library of the Royal Aeronautical Society, 4, Hamilton Place, London, W.1, is now "accessible" again after re-decorating operations, which have lasted three weeks.

Agents Anonymous

PERMISSION has been sought from the Swedish Government by the Swedish Air Force to sell about 200 Vampires. Several potential buyers, including Ethiopia, have expressed interest; but according to a Stockholm report most offers for the aircraft "have come from agents who have not revealed what countries they represent."

R.Ae.S. Branch for L.A.P.

ON September 25 an inaugural meeting of a London Airport branch of the Royal Aeronautical Society was held at the B.E.A. Viking Centre. Mr. B. S. Shenstone, B.E.A. chief engineer, presided and Dr. A. M. Ballantyne, secretary of the R.Ae.S., wished the new branch success. Mr. K. J. Anderson, chief technical officer, British Aviation Insurance Co., Ltd., spoke on *Some Problems of Aircraft Recovery*.

New Horizon

RECENTLY some blind children were given flights in a Rapide belonging to Blackburn and General Aircraft, Ltd., at the invitation of Mr. Eric Turner, chairman of the company. The children, whose flying was arranged at the suggestion of the York Round Table, were piloted by Dick Chandler, the production test pilot, and each was provided with headphones for a running commentary.

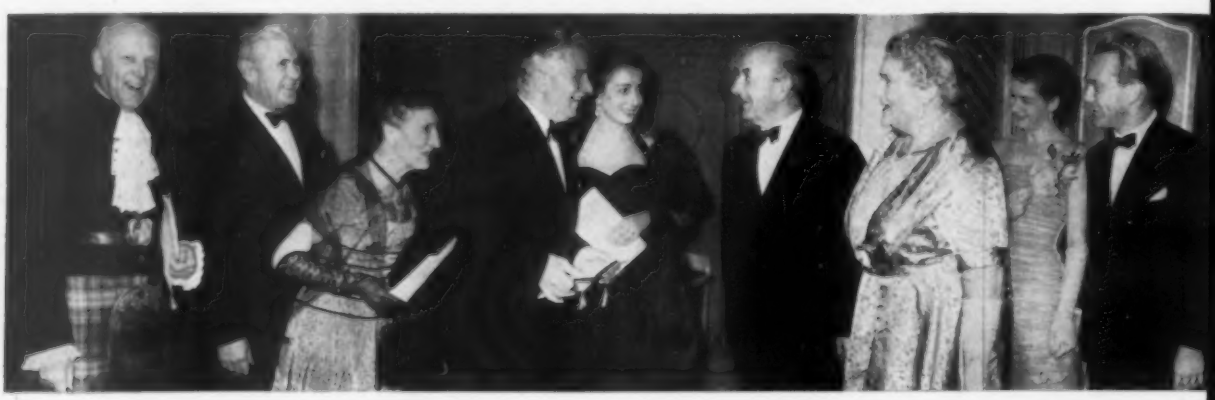
Motor Show Specials

THERE are three special issues of our associated journal *The Autocar* covering the London Motor Show (October 17-27). The first, published today (October 12) is a Show Guide, giving advance details of the 1957 exhibits. Show Report is to be published on October 19 and Show Review on October 26. Apart from the Show Report issue (which is 2s.), *The Autocar* will be on sale at its usual price of 1s.

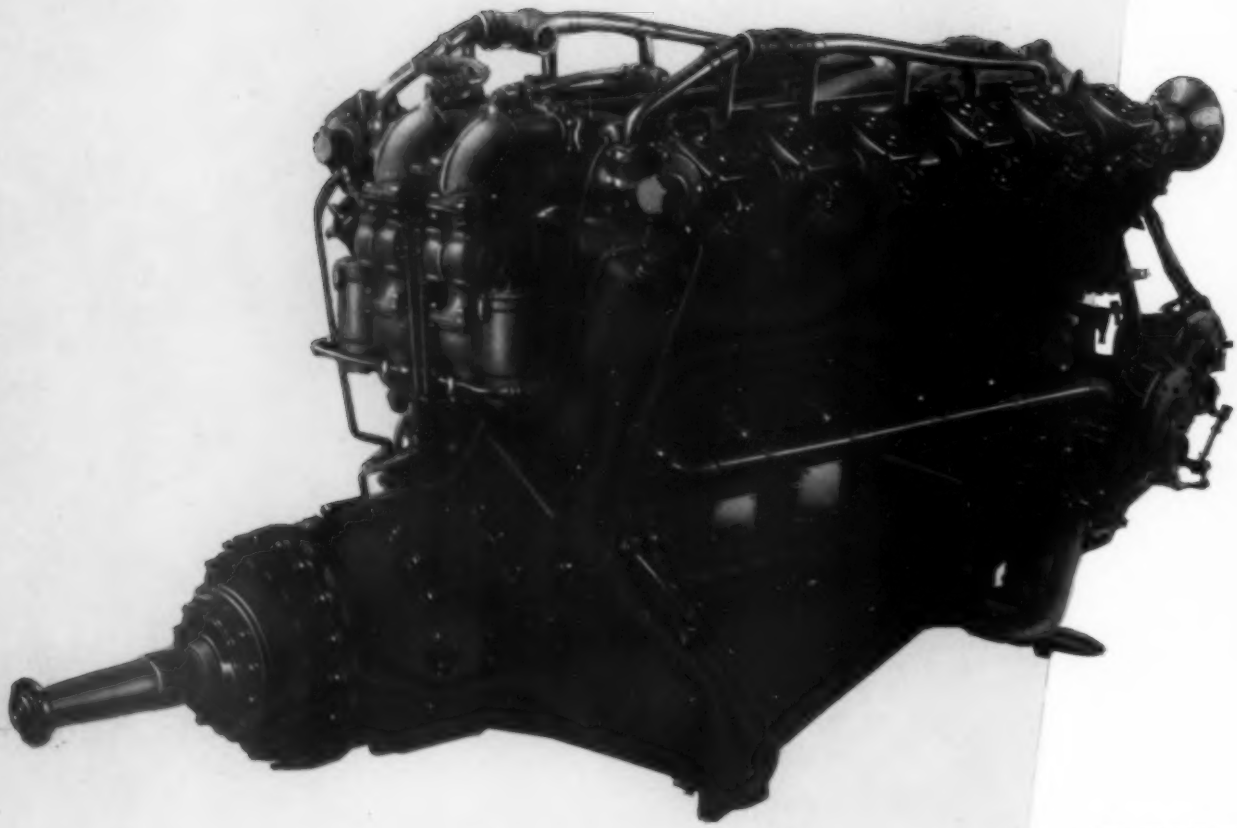
—and a Photographers' Guide

OUR associated journal the *Amateur Photographer* is publishing next Wednesday (October 17) a special "Lighting and Flash Guide." This will contain a complete and fully illustrated guide to all flashguns, electronic flash and amateur studio lighting equipment on the British market. The journal, price 1s as usual, will also contain many of its regular features.

AULD ACQUAINTANCE renewed at Sir Alan Cobham's party, held to celebrate the 30th anniversary of his Australia flight (see page 622). The cheerful faces in this "Flight" composite photograph are those of Lord Sempill, Sir John and Lady Boothman, Capt. W. L. Hope (of King's Cup Race fame) and Mrs. Hope, Sir Alan and Lady Cobham, and their son Michael with his wife.



VICKERS
VISCOUNT
FOUR ROLLS-ROYCE DART PROPELLER-TURBINE ENGINES
AN AIRLINE TICKET TO RO ANTIC PLACES
B.W.I.A. VIS OVER THE CARIBBEAN



Photograph by courtesy of the Director of the Science Museum.

ON JUNE 14th, 1919...

... the first direct non-stop crossing of the Atlantic was made by R.A.F. Pilots John Alcock and Arthur Whitten Brown flying a converted Vickers *Vimy* bomber from Newfoundland to Ireland, landing in a Galway bog after enduring great discomfort and overcoming many difficulties encountered during the 16 hours' duration of this journey of 1,890 miles.

One of the main contributory factors to the success of this historic flight was the reliability of the Vimy's Rolls-Royce "Eagle" engines. The prototype "Eagle", a water-cooled Vee 12, ran in 1915 and at once exceeded its expected performance. From the estimated figure of 200 b.h.p. at 1,300 r.p.m. the engine was producing within three years over 75% more power than was originally expected, with virtually no increase in weight. At 2,000 r.p.m. it gave 365 b.h.p. with a bore of 4.5 in. and stroke of 6.5 in., the dry weight being 900 lb. Installed in the Vickers Vimy, the Handley Page 0/400 bomber (the "Paralyser") and many other famous aircraft, the "Eagle" had a fine record both during and after the 1914-18 war.

Many past and present-day engines owe their success to continuous Esso research into the problems of fuels and lubricants.

It pays to consult

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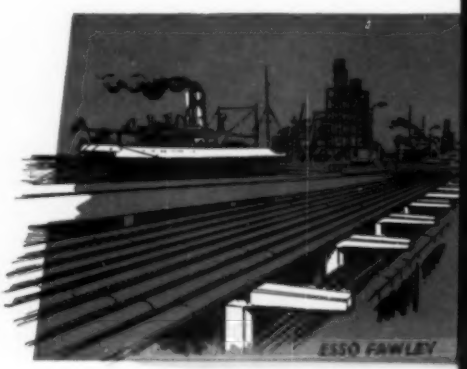


International Astronautical Congress in Rome

Dr. F. J. Krieger, of the Rand Corporation, U.S.A. (left), Prof. L. I. Sedov, a member of the Academy of Sciences, U.S.S.R. (centre), and Mr. J. Humphries, of the British Interplanetary Society, talk things over between sessions.

THIS year's Congress of the International Astronautical Federation, held in Rome, was the largest and certainly the most important to date. Its work was divided into two parts—business sessions and the technical lectures.

During the former, three further societies, those of the U.S.S.R., Poland and Belgium, were elected full members, bringing the number of societies in the Federation to twenty-four, representing twenty-one countries and nearly ten thousand individual members. There were also present observers from Israel and France. Among the 450 participants were a number of well-known personalities in the scientific world, including Professor F. L. Whipple, of the Smithsonian Astrophysical Observatory, Professor F. S. Singer, a pioneer worker on the design and use of instrument-carrying artificial satellites, Mr. A. V. Cleaver, formerly chief engineer (rockets) of the de Havilland Engine Co., Ltd., Professor L. I. Sedov, of the U.S.S.R. Academy of Sciences, and Professor J. Kaplan, chairman of the U.S. National Committee for the International Geophysical Year. Dr. L. R. Shepherd, of the A.E.R.E., Harwell, was elected the first British president of the Federation.

Nearly fifty papers were delivered during the technical sessions. As might be expected, a number of them were devoted to various aspects of artificial satellites. Of the rest, several dealt with space law and methods of propulsion, and the remainder ranged over a large number of astronautical topics. One of the earlier papers, given by Mr. N. E. Felt, was devoted to the Vanguard satellite launching vehicle, the project being developed for use during the International Geophysical Year.

It is to be a three-stage vehicle, the three stages partially fitting inside one another. The first stage is to be built by the Martin company and powered by a liquid rocket engine designed and manufactured by the General Electric Company. The engine is to use liquid oxygen and gasoline as propellants. The vehicle has no fins, but is to be controlled by a movable combustion chamber. The second stage will also use a liquid rocket motor utilizing white fuming nitric acid and unsymmetrical dimethylhydrazine. This motor, together with its associated tankage, is being made by the Aerojet-General Corporation. It, too, utilizes a gimbal-mounted rocket motor for control. The propellants in the second stage are forced into the combustion chamber by high-pressure gas rather than through the use of pumps, as in the first stage. This stage contains the three-axis gyro reference system which is to be used during the first two sections of the flight. The third stage is powered by a solid propellant motor and contains the twenty-inch spherical artificial satellite. This is enclosed within the nose cone of the vehicle, which will be jettisoned during the second stage powered flight.

The first stage will raise the entire vehicle to a height of about 36 miles and a speed of approximately 5,500 ft/sec. It will then be separated from the rest of the vehicle and will return to earth at a point roughly 275 miles from the firing site. At the time of separation, the second stage will be ignited and this will propel the vehicle along a trajectory to a height of about 140 miles, when the vehicle will be travelling at about 13,400 ft/sec. Both second and third stages will then coast to a height of 300 miles, and during this time the attitude will be controlled by an auto-pilot employing small tangential jets of high-pressure gas from the second stage pressurizing system. The third stage will then be separated and a spin imparted to it by means of small solid rocket motors. The third stage will accelerate to its final velocity of 26,000 ft/sec and the satellite proper will then be detached from it and will itself become a satellite, since its final velocity will be the same as the spherical pay-load. The vehicle is to be fired from a point near the Equator at an angle of about 40 deg to it. It will complete each revolution of the earth in approximately 90 minutes and most of the world's temperate zone will be covered by the satellite's orbit.

The effect of the earth's oblateness and its atmosphere on the orbit of an artificial satellite was discussed by J. DeNike, of the Martin company's advanced design department. The equations of motion of a satellite acted on by the earth's atmosphere and affected by the earth's oblateness were set up and solved on a high-speed digital computer, since there is no analytic solution for them. The geophysical constants used in the solution were standard ones of doubtful accuracy, but are those which are currently accepted until better values are derived from Vanguard observations.

The temperature reached by an unmanned artificial satellite is of great importance, as much of the equipment to be used has severe temperature limitations. Professor F. S. Singer and D. T. Goldman dealt with this problem. The major heat sources are (1) the sun, (2) sunlight reflected from the earth, and (3) long-wave radiation from the earth. In some instances there is also an internal heat source. This applies solely to a satellite travelling above the effective atmosphere, that is, at a height greater than 300 to 400 miles.

Second only in importance to the propulsion problem is that of the satellite's re-entry into the atmosphere. This problem was dealt with by T. R. F. Nonweiler, of the College of Aeronautics, Cranfield. He discussed the limiting maximum temperature which would be reached close to the wing leading edge in sustained level flight at orbital speeds. The limit to the temperature reached is imposed by the action of conduction of heat within and along the skin. The results deduced are relevant only to a wing of wedge section, constructed as a hollow shell with a thin skin. Since the wing loading of such a vehicle must be low, then the wing thickness (that is, wedge angle) can be quite large and an all-wing design seems probable.

Perhaps of the greatest practical interest to most participants was a short address given by Professor F. L. Whipple on the visual programme for the artificial satellite plans for the International Geophysical Year. The optical tracking programme consists of (1) the photographic programme involving the use of 12 twenty-inch Schmidt photographic cameras which are being specially designed; (2) the visual observation programme which is to involve volunteer groups of observers using simple optical aids; and (3) professional astronomers' programme involving specialized equipment in astronomical observatories. This programme will largely depend on the equipment available, and has, as yet, been little developed.

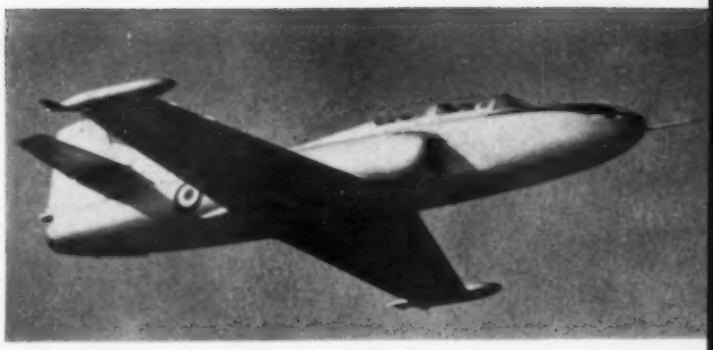
The visual programme has been given the name "Project Moonwatch," and its organization is actively under way. "Moonwatch" observers will have much to do with the success of the precision photographic tracking programme. During the observing period, which will not be greater than two hours, each observer will be permanently on duty. On seeing the satellite, the discoverer will warn the time-keeper and recorder of the party and so prepare them for accurate time determination. A short-wave radio will be used to obtain accurate time signals. The satellite will then be followed by other observers and an attempt will be made to produce an accurate record of its path among the fainter stars. These observations will be immediately transmitted to the central computing bureau and fed into the computing machine.

The availability of electronic computers for satellite orbit calculations was discussed by H. R. J. Grosch, of the General Electric Company. The type of calculations required were quite similar to those which have been carried out by astronomers for over half a century, but the tremendous advances in computing machinery enabled calculations which took several days in the 1890s to be performed at the present day in a third of a second. Speeds from ten to 100 times as great would certainly be available in three or four years. Thus the necessary equipment is now available, but work is still required to enable the data to be put into the correct form by the computers.

Of the remaining papers, only a few can be commented on. One of the projects of the near future, after establishing artificial satellites of the earth, will be that of setting up artificial satellites

(*Concluded on page 608*)

FLYING THE G 82



Handling Characteristics of Fiat's Jet Trainer

By VICO ROSASPINA

EARLY last year I had the opportunity of flying the Fiat G 82 at a time when it was still experimental and in the flight-test stage. It was, incidentally, the first aircraft in which I exceeded 1,000 km/hr (620 m.p.h.) and, even at that early stage, I was favourably impressed with its safety and with its maximum and stalling speeds.

Since that time a number of G 82s have been built in the Fiat factories at Turin and these have now been assigned to the jet training schools of the Italian Air Force, where they are flown together with T-33s. By virtue of this I recently had a further opportunity to fly the G 82 at the Jet Centre at Foggia when I was carrying out an attachment as a reserve officer and flying a number of modern jet fighters.

The configuration of the G 82 is well known. It is a low-wing monoplane with two seats in tandem for instructor and pupil, and is powered by a Rolls-Royce Nene. It has a retractable nosewheel undercarriage, slotted flaps, powered ailerons and fixed tailplane. A tail-braking or anti-spin parachute is mounted above the jet efflux, and a large, perforated dive brake extends from under the fuselage. A pair of 0.5in machine guns are mounted under the top decking of the nose section. Panels which expose these also give access to communication radio and A.D.F., while a landing light shines through a plastic panel under the nose cone. Rockets, bombs and tanks can be carried on under-wing pylons in addition to small tip tanks. Most controls, together with a gyro gun-sight, are installed in the front cockpit and clearly arranged on canted panels. Other switches and indicators are distributed along sloped lateral consoles and on a central panel extending downwards between the pilot's legs. The instructor's cockpit contains a less comprehensive, but equally well laid out, range of dials and controls. The cockpits are pressurized and air conditioned and while, in some G 82s, Martin-Baker Mk 2 automatic ejection seats are fitted, other machines have one or two Martin-Baker Mk 4 lightweight seats. Arguments in favour of tandem or side-by-side seating were carefully considered by the designers, and the tandem arrangement was chosen in order to give the pupil, who would by the time he flew the G 82 already have considerable flying experience, a sense of independence from his instructor.

Noteworthy characteristics of the G 82 are that its handling qualities are similar to those of modern jet fighters. Yet its wing loading is not excessive and landing and take-off runs are therefore short and manœurvability in flight is good. The air-brake is efficient, and does not give an untoward pitching moment when extended. Boundary-layer fences on the wings, placed in the area influenced by the ailerons, give good low-speed behaviour. The aircraft's endurance is sufficient to allow really useful training flights at fairly high speeds. Visibility is equally good for both instructor and pupil and equipment is modern and comprehensive, giving maximum comfort and safety. The ejector seats are automatic, and the canopies are automatically jettisoned by pneumatic rams at each hinged section. Armament installations, including machine guns, rockets, bombs, ciné gun-camera, and reconnaissance camera, are easily interchanged and maintained. Accessibility for maintenance has been particularly carefully studied and engine-changing is straightforward. The aircraft's ultimate load factor is 15.

From the pilot's seat the visibility is very good in all directions. Some 7,500 r.p.m. are sufficient to get the aircraft moving; and half this power is enough to maintain taxying speed and to turn. Precise steering with the brakes is easy.

For take-off, trim is set at neutral. Directional control during the ground run is excellent and, if the nosewheel is lifted at 80 kt, the aircraft is airborne in only about 700 yards of ground run. The undercarriage retracts rapidly, speed builds up smartly and good manœuvrability is immediately apparent in all three axes. Initial rate of climb is about 3,500ft/min up to over 20,000ft. During the climb at 100 per cent power, with no untoward rise in j.p.t., I tried the static longitudinal stability, observing correct increases in stick force with speed, and the dynamic stability, noting a quick damping of longitudinal oscillations with stick both free and fixed.

At 20,000ft I tried stalls in the landing, powered-approach, cruising and gliding configurations, with accelerations of 1, 1.5 and 2 g. I also made three turns of a spin. Stall warning is good, beginning with strong airframe vibration at about 130 kt increasing in intensity down to 110 kt I.A.S. Below this speed the G 82 dropped its nose straight to an angle of about 50 to 60 deg; recovery was immediate.

In order to spin I had to reach stalling speed and apply pro-spin rudder when the nose dropped. Entry into the spin was difficult and the first two turns were irregular. Rates of roll and turn varied to begin with, the first revolution taking about 5 sec. Recovery could be effected at any moment simply by centering the rudder, because the G 82 had to be held in the spin. Application of forward stick is not desirable during spin recovery because the aircraft does tend to go into an inverted dive. Spinning with the tip tanks attached is perfectly safe.

I determined the minimum trim speeds in the landing, powered-approach and overshoot configurations with satisfactory results. As for spiral stability, the manœuvre margin was clearly positive in the powered-approach and cruising conditions. At 38,000ft, with the aircraft trimmed, I noted that it retained excellent static and dynamic stability in accelerated manœuvres in a power-on, clean configuration at various speeds and with up to 3 g. The response to rapid corrections was also good. Decreased ambient temperatures did not cause any friction in trim and flying controls; and centering and break-out forces remained normal. Pressurization, air conditioning and heat distribution, and de-icing were very good. The oxygen blinkers (of the American demand-regulator type) were very easy to see and the valves came readily to hand.

I also tried compressibility effects at various altitudes. At 30,000ft there were no effects up to 0.83 Mach when slight airframe vibration began, increasing up to 0.89 Mach when they could be felt on the stick as well. There were no other symptoms and no tendency to drop a wing, although a slight nose-up tendency, caused by the static stability qualities of the aircraft, occurred as the speed increased. This could be easily trimmed out. Deceleration could be achieved either by extending the airbrakes, which had no adverse effects at 0.89 Mach, or by pulling the stick back and achieving 4 to 5 g. The G 82 remained easy to control at the top of its Mach range.

The highest straight-and-level speed at 20,000ft is 910 km/hr. Best endurance at 20,000ft and 275 kt T.A.S. is 2 hr 40 min, or 2 hr 45 min at 30,000ft at 329 kt T.A.S. At the latter height and speed the best range is 865 nautical miles. The service ceiling (400ft/min) is 41,000ft. Aerobatics are easy to perform and the aircraft is stressed for all types of manœuvre. The G 82's excellent stability makes it a good platform for firing and bombing as well as for photographic reconnaissance.

FIAT G 82

Rolls-Royce Nene 2/21 or 6/21

	R-R. Nene 2/21	R-R. Nene 6/21
Total weight	13,780 lb	
Span	38ft 9.5in	
Wing area	270.6 sq ft	
Take-off thrust	5,000 lb	5,400 lb
Maximum speed	490 kt	500 kt
Stalling speed	100 kt	100 kt
Maximum Mach number	0.88	0.88
Range, with normal tankage, at 29,530ft at 313 kt T.A.S. allowing for take-off, climb and descent	620 nautical miles	
Time of climb to 19,700ft	5 min 30 sec	4 min 30 sec
" " " 29,530ft	10 min 30 sec	8 min 15 sec
Service ceiling (400 ft/min)	41,000ft	42,600ft
Take-off run	2,130ft	1,970ft
Landing run	2,790ft	2,790ft
Normal fuel capacity	386 Imp. gal	

N.B.—Two 66 Imperial gallon tip-tanks will increase the quoted range; and further tanks can be carried on the under-wing pylons. There are attachments for eight 5in HVAR rockets under the wings and, as alternatives to bombs of up to 500 lb, the main pylons can carry 0.5in machine-gun packs or 2.75in rocket packs.

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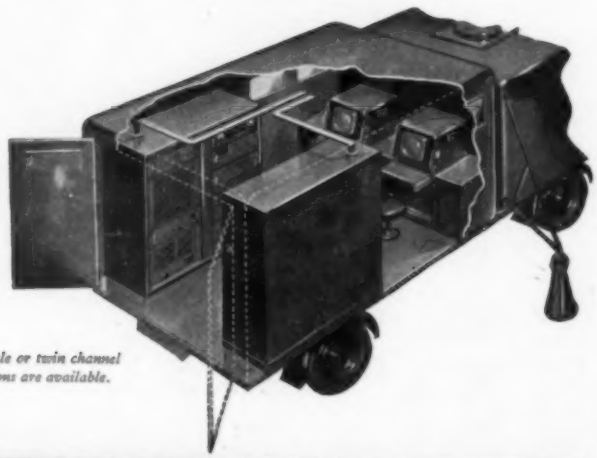

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CUTAWAY CUTLASS

THE Chance Vought F7U-3 Cutlass is a high-speed, carrier-based, sweptwing, tailless aircraft powered by two afterburning Westinghouse J46 engines in the 6,000 lb-thrust class. It can serve with equal effectiveness as an intercepter, fighter and attack machine.

Top straight-and-level speed is in excess of 650 m.p.h. and the rate of climb more than 13,000 ft/min. It has no Mach number restriction. Coupled with this performance, it has a load-carrying ability that lends itself well to U.S. Navy attack requirements. During carrier-suitability trials aboard the U.S.S. *Coral Sea*, for example, the F7U-3 with full internal fuel and more than 5,000 lb of external stores was launched from an H4-1 catapult. This was an unprecedented load for a ship-based jet fighter.

The F7U-3, developed from the prototype F7U-1, had its beginnings in February, 1950. The mock-up was completed in April of that year and the first flight was made on December 22, 1951, with John McGuyrt, Chance Vought's chief of flight test, at the controls. Pre-carrier tests, marked by high aircraft availability, were completed in July, 1952. Lt-Cdrs. E. L. "Whitey" Feightner and A. B. Conners made 72 flights in 29 days with the new Cutlass before taking it aboard.

Next step in the F7U-3's advance towards final acceptance after the July 1954 land tests came last November aboard the *Coral Sea*. With Capt. Lynn Helms, U.S.M.C., and Lt-Cdr. Conners at the controls, the Cutlass was evaluated in the overload configuration. It was at this time that it was launched from the H4-1 catapult with the above-mentioned loading—this despite the fact it was operating with interim engines (non-afterburning Allison J35s) that were being used pending delivery of the J46.

No significant engineering changes resulted from either of the carrier-suitability trials. An earlier trial with the prototype F7U-1, however, had resulted in a canopy change and a drooping of the F7U-3 nose for better visibility. Compared with the F7U-1 prototype, the -3, in general, is a more versatile, longer-range aircraft. It has more power and carries more fuel and armament. The control system has been perfected and a sturdier landing gear added. The basic, tailless configuration remains unchanged.

Four 20 mm cannon comprise the internal armament. A number of 2.75in Mighty Mouse rockets can be carried in the fuselage rocket pack and two pylons under each wing can carry bombs, tanks or rockets. A new version, the F7U-3M, with four Sparrow air-to-air guided missiles, made its first flight on July 12, 1954. Another version, the photo-reconnaissance F7U-3P, flew in July 1955. Equipped to carry up to five cameras in its elongated nose, the -3P can do general reconnaissance work, beach and offshore missions, mapping flights and night reconnaissance.

Pilots say the F7U-3 is an easy machine to fly. The Cutlass can be flown in a stalled condition in the landing configuration under full control—a highly desirable quality in a carrier-based fighter. As soon as the power is cut the nose drops through easily at touch-down, with no attendant wing-drop or yaw. Pitch and yaw dampers give the Cutlass a high degree of stability. Speed brakes, of the split-wing, trailing-edge type, give good braking effectiveness with little or no trim change.

Additional flexibility and reliability are gained from the twin-engine configuration. On one engine, with combat power, the F7U-3's performance is almost equal to that of two engines with military power. Since a wave-off can be accomplished on one engine, a normal landing can be made with the other shut down.

Owing to its tailless configuration, the Cutlass employs "ailavators" (normally termed "elevons" in Britain) which function both as elevators and ailerons. Located on the trailing edge of the wing, these surfaces are deflected symmetrically as elevators and differentially as ailerons. They are power-actuated through a push-rod system controlling the servo valve. Lateral and longitudinal feel are provided by simple centering springs and a pitch-damper installation in the elevator control system provides elevator deflection proportional to pitching velocity for damping.

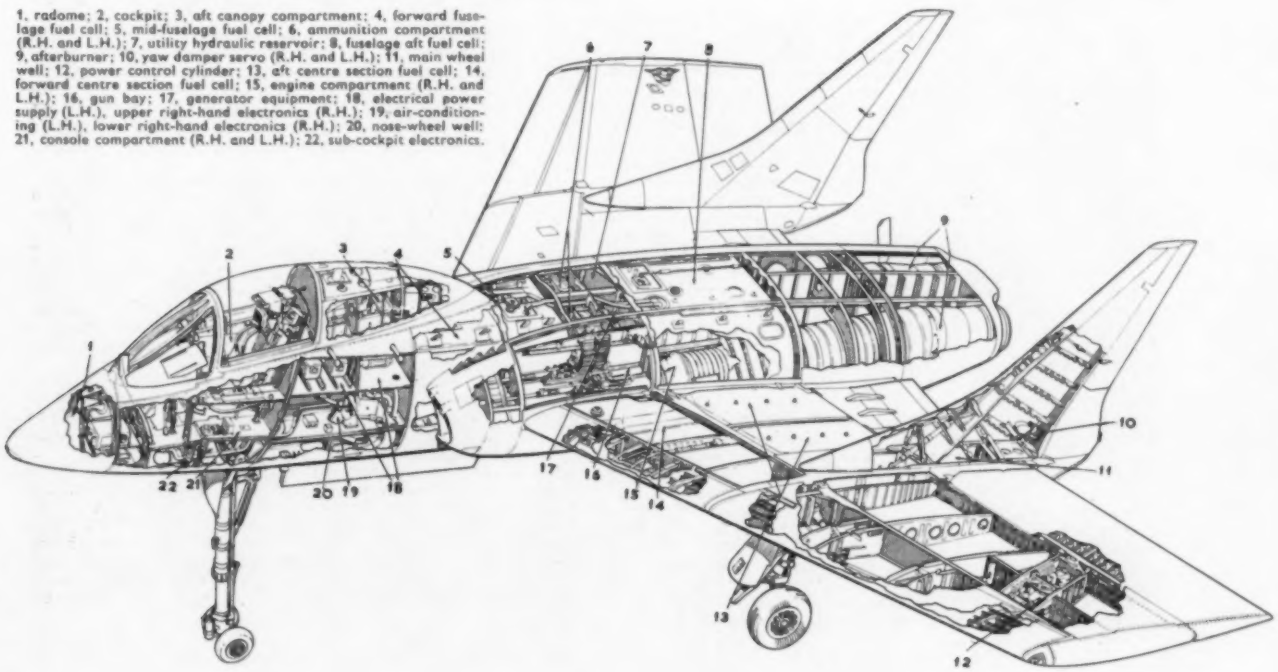
Ailavator power is supplied by two independent systems. Each ailavator is actuated by tandem power cylinders providing 30,000ft-lb per ailavator at 3,000 lb/sq in. Each cylinder in the tandem, with its counterpart in the wing, is in a completely independent hydraulic system supplied by one pump on each engine. A stand-by electrically-driven pump is provided to supplement control with windmilling engines, thereby providing a third independent source of power in case of total engine failure. The control system has been completely "shaken-down" for combat damage, giving assurance that Cutlass pilots will have the maximum chance of getting home should parts of the system be knocked out by gunfire.

Pressure fuelling and defuelling is done through two pressure line attach fittings on the bottom of the fuselage. Either (or both together) can be used to fill the entire system.

The Cutlass has two auxiliary rudders located below the rudders mounted on the fins. They are hydraulically operated and serve three functions: they give directional trim through a pilot-operated trim switch; they give yaw damping with deflection proportional to yawing velocity as measured by a gyro, for improved lateral directional damping; and they provide directional stiffening with deflection proportional to sideslip angle in landing only to increase slow-speed directional stability.

Unlike many jet fighters, the Cutlass has a most roomy cockpit, which is popular with pilots. Features include a curved instrument panel for easier readability, electrically-adjustable rudder pedals for any leg length, and a "rocking chair" seat which is electrically raised or tilted forward. The seat is designed for back-type parachutes, which many pilots prefer.

1, radome; 2, cockpit; 3, aft canopy compartment; 4, forward fuselage fuel cell; 5, mid-fuselage fuel cell; 6, ammunition compartment (R.H. and L.H.); 7, utility hydraulic reservoir; 8, fuselage aft fuel cell; 9, afterburner; 10, yaw damper servo (R.H. and L.H.); 11, main wheel well; 12, power control cylinder; 13, aft centre section fuel cell; 14, forward centre section fuel cell; 15, engine compartment (R.H. and L.H.); 16, gun bay; 17, generator equipment; 18, electrical power supply (L.H.), upper right-hand electronics (R.H.); 19, air-conditioning (L.H.), lower right-hand electronics (R.H.); 20, nose-wheel well; 21, console compartment (R.H. and L.H.); 22, sub-cockpit electronics.



UPHILL LANDING

A Novel Technique Developed in the Alps

ONE of the fascinations of flying is that the technique of piloting an aeroplane has infinite variations and is continuously evolving. Man has been handling heavier-than-air machines in flight for 65 years—ever since Lilienthal first showed the world that controlled flight was possible in a "hanging-type" glider. During that time piloting technique has developed continuously and has adapted itself to an amazing range of operational requirements. Highlights in this evolution immediately spring to mind: solo and dual flying instruction, pylon racing, flying in high winds and turbulence, the whole field of aerobatics, seaplane flying and night flying, pilotage across country, flight over the sea by dead reckoning, multi-engined flying, air combat, bombing, instrument flying, over-sea navigation, slope soaring, thermal soaring, wave flying, glider towing—the list is endless and beyond comprehensive record but every step has called for initiative, application and enthusiasm on the part of countless pilots.

In recent years most of the developments in technique have been associated with changes in the flying characteristics of aeroplanes as wing loadings have increased in parallel with greater operating speeds and heights. Procedures have also become more exacting as a result of technical progress in design: retractable undercarriages, flaps, variable-pitch airscrews, the gas turbine, pressurization and many other innovations have altered the pilot's environment. He has also had to contend with many new flying, approach and navigational aids and to operate over much greater distances at higher speeds and under an ever-widening range of weather conditions.

As a change from these well-known recent trends, it is stimulating to learn about an entirely new field of progress in flying technique. The Swiss pilot, Hermann Geiger, in his recently published book "Alpine Pilot" (Cassell and Co., 10s 6d), describes vividly his development of the new art of landing and taking-off from small spaces in the high mountains of the Alps. Since 1952, using a Piper Supercub light aircraft fitted with a combined wheel and ski undercarriage, Geiger has made, without accident, several thousand landings—and subsequent take-offs—from glaciers, steep snow slopes and other incredibly small spaces in the high Alps. Geiger learnt to glide and then to fly powered aircraft at Sion in the canton of Valais in French Switzerland nearly twenty years ago. It was not, however, until 1950 that he started in business, still based on Sion, dropping supplies from the air to isolated sites in the mountains. Two years later, he went a stage further and started to develop the unique technique, of regularly landing and taking-off from small spaces high up in the neighbouring mountains, which has since made him famous.

Several pilots in the past have pulled-off spectacular landings and take-offs from mountain tops but these have always been isolated "stunts." Geiger mentions that of François Durafour on the Dôme du Gouter in 1921 as perhaps the first and there have been several similar exploits since. British readers will, for example, remember that by Bert Hinkler and John Leeming on Helvellyn in 1926. However, this, like others, was undertaken for publicity reasons. Geiger's achievement is quite different. Over a period of years he has made his landings in the Alps while engaged in carrying supplies, passengers, building materials and food to mountain huts, construction sites and similarly remote places. He has also done much gallant work, sometimes under dangerous weather conditions, rescuing and bringing quickly to hospital injured mountaineers and skiers who might not otherwise have survived or who would, at best, have had to put up with long and painful journeys, carried by guides down steep mountainsides.

Perhaps the most remarkable feature of this work of Geiger's is the fact that he has evolved a technique which is sufficiently flexible for landings to be made in an astonishingly large variety of inaccessible and difficult places. All he needs is a reasonably smooth and level surface about fifty yards long. This platform must adjoin a further length of smooth surface which should not have a slope (downwards from the platform) greater than about ten degrees—although this may, and usually does, increase away from the platform. Geiger's technique is to fly towards his platform and then dive gently towards a point on the mountainside at a rather lower level. He then throttles back, pulls up the nose of the aircraft until he is flying parallel with the rising slope, lowers the flaps and finally opens the throttle so as to delay the touch-down to the selected moment. As soon as the skis make contact with the surface, the aeroplane must be pulled up the slope at full throttle until the extreme inner end of the platform is reached. If there is still some slope at this point it may be necessary to swing the tail with the rudder so that the small ski on the tailskid digs in and prevents the aircraft from sliding backwards. For take-off, the aircraft is turned round by the pilot lifting the tail until it is again at an angle to the slope but facing away from the mountain. The pilot then gets in, swings himself straight with a burst of engine and takes-off down the slope. In both take-off and landing, wind direction is ignored. The slope is the over-riding factor and the pilot's main concern with the wind is to allow for drift on touch-down and its effect on turbulence—undoubtedly the pilot's most important single problem.

Geiger has used the above technique, with slight variations, for thousands of landings at scores of places in the Alps. He has attained a high level of confidence in his ability to judge a suitable landing place from the air so that he can land on it without preliminary reconnaissance on the ground. This is, of course, an invaluable facility for rescue work. With all this, Geiger has retained a sufficient sense of caution and an understanding of his own and his aeroplane's limitations which has enabled him, so far, to avoid any accident during these inevitably hazardous operations.

As an illustration of the level of confidence reached, an incident in "Alpine Pilot" is well worth repeating. On one occasion, Geiger took a very old gentleman, a retired mountaineer from Zermatt, for a flight in the mountains. He duly landed him at a point 12,000ft up on the Rosa plateau. After the old man had absorbed, once again, the delights of the high mountains which he had thought he would never see again, Geiger proceeded to give him again the sensations of the skier by allowing the Supercub to "ski," with its engine running, for a descent of five miles! At the bottom of the slope, the engine was opened up, the aircraft took off and the old man was taken home!

Geiger has written this book in association with André Guex, an accomplished writer. It has been translated into English by Alan Tuppen. The result is an absorbing account of a new step in man's long struggle with the last of the elements and is one which every pilot should read. Its straightforward writing and beautiful illustrations are not to be missed. P. W. B.

INTERNATIONAL ASTRONAUTICAL CONGRESS

(*Continued from page 605*)

of the moon. This was discussed by R. W. Buchheim, of the American Rand Corporation. Two cases of satellites were considered—retrograde and direct. A direct orbit is one in which the satellite revolves in the same direction as the earth/moon system, and a retrograde orbit, one which revolves in the opposite direction. The author showed that the establishment of a retrograde orbit is the easier of the two cases, and a permanent optically observable moon satellite could be established through the use of a booster rocket system weighing something more than 1,000,000 lb.

Propulsion has always been, and still is, the major problem in all interplanetary projects. In addition to the conventional chemical rocket, various other systems have from time to time been suggested. A further possibility was discussed by K. A. Ehricke, of the Convair-Astronautics Division of General Dynamics, in his paper on "The application of solar power in space flight." Solar energy would be collected by the use of a pressure stabilized spherical collector, one half of which would be sprayed with silver or aluminium. This would be used to heat a working fluid of low molecular weight. It was shown, in fact, that hydrogen would be the only feasible fluid.

Equal in importance to the engineering problems in manned space flight would be the reactions of the human to space conditions. With present-day high-speed jet aircraft it is possible to produce the sensation of weightlessness for periods of ten to 30 seconds; this can be done during dives and parabolic flights. A series of reports on personal experiences of sixteen subjects during such short periods of weightlessness was given by Dr. S. J. Gerathewohl, of the U.S. School of Aviation Medicine.

Apart from motion-sickness and its possible counterpart, space-sickness, the other major biological hazard is collision with heavy primary cosmic rays. Opinions on the possible effect of these are conflicting, but experimental evidence is now being produced and some of this was reported by Major D. G. Simons, of the U.S.A.F.

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The Supermarine Swift F.1 is referred to in the paragraph "Halton Equipment" on this page. The D.H. Tiger Moth is one of four which Hants and Sussex Aviation, Ltd., are overhauling for W. S. Shackleton, Ltd., who have themselves secured an order to supply these aircraft to the Royal Navy. So the old "Tiger" still "burns bright."

AIRCRAFT INTELLIGENCE

Great Britain

Armstrong Whitworth Freighter/Coach. According to *American Aviation*, this forthcoming transport, officially announced details of which were given last week, will be of twin-boom layout. The version with two Rolls-Royce Tynes, says the American journal, will be slightly lighter. It is added that the project was originally launched to meet a British Government specification.

Halton Equipment. A reader who visited No. 1 School of Technical Training at Halton recently made the interesting discovery that no fewer than twelve Supermarine Swifts are used there for various instructional purposes. They are mostly F.1s, and three of them retain the markings of No. 56 Squadron, the only unit ever equipped with these aircraft. A photograph of E for Extra, now without its original airframe serial number, but carrying "7300M" to denote its ground instructional role, appears on this page. Our correspondent also saw several Meteor F.3s and F.4s and a number of F.8s, the latter still carrying the markings of numbers 41, 63, 245 and 600 squadrons, all of which (except No. 600) have now re-equipped with Hunters. An all-silver Meteor F.8 exhibiting several modifications, turned out to be none other than VZ517, which was fitted with the Armstrong Siddeley Screamer rocket. Other aircraft used by the School include Lincoln, Buckmaster, Anson T.20, Mosquitos of several marks, Vampires (including a prototype), and two Venoms. Nose sections of Canberras, a Beaufighter and a Hunter are also available.

Folland Gnat. It is reported by *Aviation Week* that Japan's Air Self Defense Force is considering the purchase of Folland Gnats, and that evaluation may take place next year.

U.S.A.

Bell XH-40. The first of three of these turbine-powered helicopters is nearly complete and should fly before the end of the year—about 17 months after the development programme was initiated. One example has also been built for static tests, and a contract for six YH-40s for service trials is expected.

Lockheed F-104A and B. Contracts have been awarded to the Lockheed Aircraft Corporation by the U.S.A.F. to the extent of $166 million and covering production of an undisclosed number of F-104A and F-104B Starfighters. The $115 million contract for F-104As is said to be the largest single contract awarded to Lockheed during its 13 years of continuous production of jet-propelled aircraft. The F-104Bs are two-seat fighter/trainers.

Douglas C-132. This truly gigantic military transport, to be powered by four Pratt and Whitney T57 turboprops, each of 15,000 s.h.p., is scheduled to fly in mid-1959.

Poland

SM-1 Helicopter. The Transport Equipment Factory of Swidnik, Lublin, will turn out about fifteen SM-1 helicopters by the end of the year. The SM-1 is a Polish version of the Soviet Mi-1 and all parts, except engines, which will be imported from the U.S.S.R., will be Polish-made. Series production will begin next year. The first SM-1s will be principally used for the training of pilots. The 575-h.p. engine will give a top speed of about 125 m.p.h.; ceiling will be about 16,000ft and range 200 miles. The cabin will be heated and the blades will have de-icing equipment. Next year, an ambulance version will be produced, and an agricultural version is also in view. Five Poles have now received helicopter licences, having trained under Soviet direction.

Italy

Aerfer-Ambrosini Sagittario 2. The prototype of this Italian light fighter made its first flight near Rome on May 19 and appeared at the Fiumicino air display in June. During subsequent test flights a speed equal to Mach 0.94 was reached at a height of 25,900ft. The machine is powered by a Rolls-Royce Derwent 9 of 4,000 lb thrust, installed in the nose, with the jet pipe under the fuselage. It carries two 30 mm cannon of 70 calibres. The second prototype will have low-pressure tyres. In photographs the canopy/windscreen structure is seen to be similar to that of the Gnat; the ejector seat is by Martin-Baker; the main undercarriage has a levered suspension; the tailplane is variable in incidence; and the tail cone probably contains a braking parachute.

WIDGEON in the Air

No. 55 OF THE SERIES

By THE EDITOR

ALTHOUGH the approach to this account is rather different from that of most of our "In the Air" articles, it is essentially a pilot's impressions of a new type of aircraft, and has therefore been included in the numbered series.

HELICOPTERS as a class are ungainly in appearance; they seem all noisy elbows, and gauche, unexpected movements. Yet this year, from a rather less spectacular Farnborough than usual, many people gained the impression that helicopters have come along fast during the past twelve months. Several very different types demonstrated unexpected manœuvrability; they managed to look safe while doing it and the gaily painted Widgeons, in particular, also looked elegant. The public in Great Britain almost always sees helicopters at play rather than at work and thus it is more difficult to view them seriously.

Within a short time of the S.B.A.C. Show's closing, I was happy to accept an invitation by Westland Aircraft, Ltd., to visit them to fly the Widgeon and to see if I did not think that handling improvements matched the lively performance and appearance. That the impressions which follow are not recorded by an experienced helicopter pilot, nor even by one in regular flying practice on such machines, is of little importance. The extent of the differences in flying the S-51 Series 2 Widgeon and the early S-51 Dragonfly are so marked that no great knowledge or subtle appreciation is needed to detect them.

There are still very few experienced British helicopter pilots, but there are a great many with fixed-wing experience who may like to imagine their own reactions in similar circumstances. Fixed-wing flying does not help with helicopter flying, only with airmanship and perhaps engine handling. This I have mentioned before.

One does not need to look hard to see that the Widgeon has many features in common with the familiar Dragonfly. It has the same central body and tail; the Alvis engine, undercarriage and tail rotor are unchanged, and the pylon supporting the rotor head is almost identical. There the similarity stops, for the head and blades are those of the larger Whirlwind, the blade span being cropped to suit the Widgeon. The cabin is much redesigned to give side-by-side seating—with dual control if needed—in front, and a comfortable, three-abreast bench behind. Ambulance and other layouts are also possible. Those who memorize registrations will realize that the first two Widgeons are in fact transformed Dragonfly prototypes.

The flying controls, like those on the later Dragonflies and the Whirlwinds, are hydraulic servo-assisted, and, together with the Whirlwind head, they provide a marked increase in stability. The Dragonfly's sensitivity over c.g. position has gone, and with

(Above) "Then it was up to me and the Widgeon to get airborne, first with me in the left-hand dual seat. . . ." (Right) The Widgeon's rotor head, pylon and winch. The head is that of the Whirlwind, the intakes have been tidied up and the pitot head is now on the port side.

"The big differences in flying the Widgeon seemed to me to be in its stability and the feel of its cyclic pitch lever. . . ."

"FLIGHT" photographs

it the need to add ballast in the nose or elsewhere, according to load.

Instructor and safety pilot for my flying was W. H. "Slim" Sear. He showed me what the aircraft could do under his control, what it should not do under mine, and where the knobs and switches were to be found. Then it was up to me and the Widgeon to get airborne, first with me in the left-hand dual seat, then flying from the first-pilot's pew.

Let me, first, run over the starting-up procedure. We will assume that the exterior and before-starting checks have been completed, and that as a result we are satisfied about obvious serviceability matters and that the instruments are working, the controls free and fuel is in the tanks.

The photograph of the cockpit and instruments will help in identifying the levers and switches to be operated. First, then, the wheel-brake lever is pulled back to the "on" position, and the rotor-brake lever beside it on the right-hand wall of the cockpit is moved forward to the "off" position. Next, turning to the levers on the central gate, the combined oil and fuel cut-off cock is pushed on, and the oil cooler shutters—next lever on the left—are adjusted according to temperature requirements.

Before attempting to start the engine, it is usual to check for what the R.A.F. used to call (and probably still does) hydraulic-ing. This simply entails pressing the starter with magnetos off to make sure that the engine will turn and that none of the cylinder heads has filled up with oil.

You are now almost ready to start. All that remains is to put on the booster-coil switch and the fuel-booster pump, to check the fuel pressure and then to switch on the magnetos. On receipt of the all-clear from outside, and with the twist-grip throttle on the collective pitch lever slightly open, the starter button in the end of this lever sets the motor turning. Starting from cold, the primer push-button is operated while the starter is turning the engine.

As soon as the motor is idling, the familiar checks of oil pressure and other instruments are made as for any other aircraft. When operating temperatures and pressures have been reached, the rotor brake is double-checked and the twist-grip then turned up to between 1,700 and 2,000 r.p.m., at which point the rotor accelerates, its clutch having started to engage at around 1,200 r.p.m. Incidentally, it is better to call the rotor brake the rotor parking brake, because in fact it can only be used to halt the last few r.p.m. of the rotor, and to prevent windmilling when the aircraft is parked.

Almost instinctively the pilot puts on plenty of left rudder to check torque as the main rotor r.p.m. build up. After this, the operation of the controls is checked both with and without hydraulic servo assistance. (How useful it is, when trying to get used to a new machine, to find that the operating limits are colour-band marked on the instrument dials.)

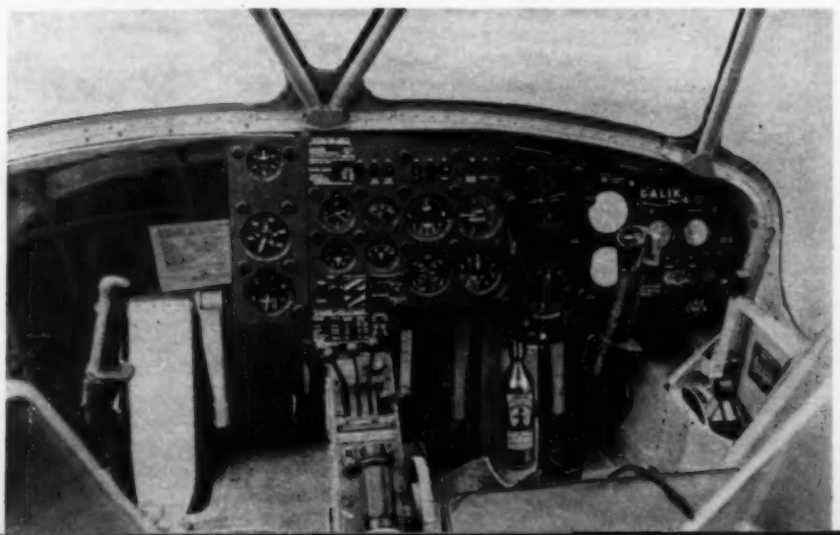
Before taking-off or taxying—one seldom sees a helicopter taxy, but they do it perfectly well—it is usual to check magnetos, as with any other aircraft, and in the case of the Alvis Leonides, the correct speed is 2,800 engine r.p.m. After this, instead of the more usual idling check, with a helicopter the pilot twists up to the full 3,000 r.p.m. and then sharply cuts the throttle with the twist-grip to make sure that the rotor freewheel action is operative. He can then also check the engine idling.

The big differences in flying the Widgeon seemed to me to be in its stability and the feel of its cyclic-pitch lever. The stick produces the expected results without delay and it is extremely light and sensitive to use. There is scarcely any relationship between the way it now functions and the way its counterpart worked on G-ALIK in early manual-control form. If the servo-control selector is switched off, the pilot receives a quick reminder of how the original Dragonfly controls felt.

As for stability, the one-armed paper-hanger technique has given way to a placid guidance with the collective pitch control, friction-locked for much of the time. A pilot on cross-country can now fold his map, scratch his nose or play with the instruments without fear of lurching off course and altitude.

The collective pitch lever is not quite so different as the cyclic one; it resembles quite closely that on a Whirlwind, as would be expected in view of the rotor head similarity. But by comparison, again, with the Dragonfly it has been much tidied up, has a more convenient, short movement, is much lighter to operate—though not too sensitive—and is very nicely co-ordinated with control of engine power.

(*contd. overleaf*)



Note here the full blind-flying panel and duplication of A.S.I. The fore-and-aft and lateral trimmer switches are hidden, in this picture, beneath the collective pitch lever. The thumb trigger on the cyclic pitch lever is the up-and-down switch for the winch.

WIDGEON IN THE AIR . . .

An exception to all this is the rudder control (tail-rotor pedals) which seems to be unchanged and therefore, in contrast with the other much improved controls, seems ill-matched. I believe when I flew it, Widgeon G-ALIK's tail-rotor control was not at its best. It was not very effective, rather lumpy and heavy, and it did not help me with my unpractised handling at all. A larger rotor and more sensitive operation would be desirable in a later series.

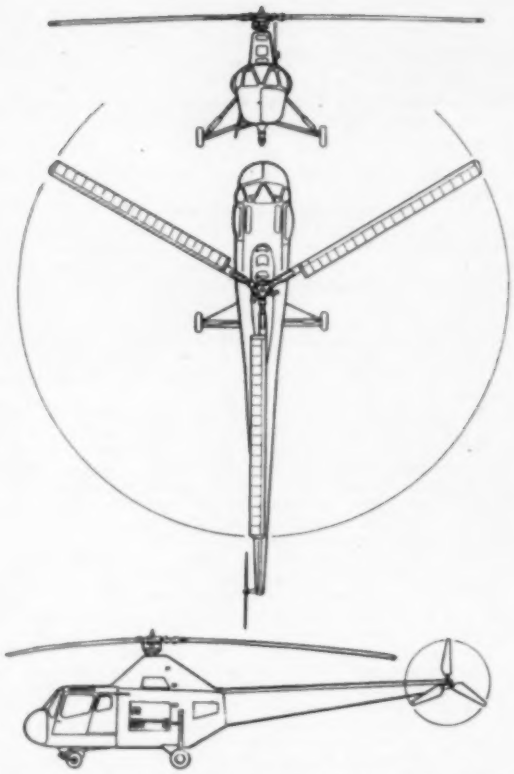
Lest I give the wrong impression, it should be stressed that the tail-rotor controls are similar to those which have been regarded as satisfactory on a very large number of Whirlwinds. But in the Widgeon one is dealing with a livelier and more responsive machine, which may on occasion require quicker response.

In addition to the servo-assisted rod-and-lever system for the main hand controls, torsion-spring trimmers have been incorporated for lateral and fore and aft adjustment. This, of course, helps further towards hands-off flying.

Indicative of the success achieved is "Slim" Sear's party trick of landing into wind and taking off again without touching the cyclic pitch lever. Naturally he first steadies and trims the Widgeon very carefully to hover at, say, 20ft, and he isn't always successful in gusty weather. I managed to repeat the manœuvre with about the same standard of flying, using all controls!

My recollections of cross-countries over moderate distances in Bell 47 or Dragonfly are not particularly pleasant. I recall some anxiety and a fair amount of wallowing in all but the calmest air. The occasional banging and flapping noises and the need to hang onto everything increased the fatigue and tension. In the Widgeon, all was different. With engine r.p.m. at about 3,000, and the superimposed rotor needle indicating 200, I eased up firmly on the collective pitch and without shake or lurch it became airborne and ready to move off in the Ilminster direction. An incidental piece of information quoted in the crew's notes interested me: "At 500ft using 2,800 e.r.p.m., the specific air range reaches its optimum value of 3.3 nautical miles/gal at 62 kt I.A.S."

Carrying two and a full fuel load, the Widgeon climbed eagerly at 50 m.p.h. forward speed. At circuit height the slight changes in power setting and control positions were made almost without considered thought. Only the minimum of adjustment of the throttle was needed at any time, and the easing down of the collective pitch lever seemed to co-ordinate boost and rotor r.p.m. without help from the pilot—as it should. Always before I have been a bit of a rotor-r.p.m. worrier; on the Widgeon I quickly felt able to let them fend for themselves, except when changing flight regime.



Within minutes of leaving the airfield I felt able to relax, enjoy the ride and examine the countryside with its terrified dots of hens, dashing in all directions. I have a theory that chickens do not look up but hear or feel the beat of the rotor blades, even 1,500ft above them, and instinctively scatter in panic, anticipating the silent swoop of hawk or eagle which might follow.

In the past I should have hesitated about recommending medium or light helicopters as transport for an executive, because of the

"One does not need to look hard to see that the Widgeon has many features in common with the familiar Dragonfly . . ."

" . . . the one-armed paperhanger technique has given way to a placid guidance with the collective-pitch control friction-locked for much of the time . . ."

noise and shake. They may be intriguing for a few rides but frankly rather uncomfortable. In the Widgeon I should expect the great man to feel quite relaxed; noise has been reduced sufficiently to permit raised-voice conversation.

It is easy to become enthusiastic about a pleasant and gratifying experience, and to say too much, but before leaving the Widgeon it would be best to land it back at Yeovil. Pilots are asked to avoid approaching over the edge of the town.

On the first circuit I had been indecisive about cutting power and pitch and descending to hold-off position. This was one of the more difficult things to learn in the first place. It took most of the long 180-deg turn to reduce speed to 45 kt, and by unnecessary movement of twist-grip and collective pitch lever I managed to disturb the engine and rotor r.p.m., well within the limits (for the rotor, 188-202), while reducing boost and assuming a reasonable rate of descent. On subsequent occasions, by being firmer and leaving well alone, the machine was guided down according to plan—even to the extent of arriving in hovering position over the selected spot.

Explained in more detail, for those who have not tried it, putting the collective pitch lever down by an inch or two and "stick" back, changed 70 kt, straight and level at about 27in boost, 2,800 engine r.p.m., and 190 rotor r.p.m. into 45 kt, 500ft/min descent at 17in boost, 2,900 engine r.p.m. and 195 rotor r.p.m. (full fine fixed-wing equivalent). At 40-50ft you slow down to the hover, holding "stick" back and pulling up on the collective pitch lever to increase blade pitch and power together. Before landing you hover at 10ft with plenty of power and r.p.m. (3,000 engine r.p.m., 202 rotor r.p.m. and some 40in of boost). The Leonides is then giving almost all of its 520 b.h.p., and the pilot has a reserve of rotor inertia to call on in the event of trouble. In all these actions, flying in the Widgeon is little different from flying in other helicopters; but for me it was a whole lot easier and pleasanter than I can remember previously.

COMPARATIVE DATA

	S-51, Series 2, Widgeon	S-51, Series 1, Dragonfly
Gross weight	5,900 lb	5,700 lb
Rate of climb at s.l.	1,190ft/min	1,140ft/min
Rate of climb at 3,800ft	1,160ft/min	1,075ft/min
Ceiling	12,800ft	11,000ft
C. of g. range	8.4in fwd.—4.4in aft	5.0in fwd.—1.2in fwd
Overall range	12.8in	3.8in
Max. speed at 3,000 r.p.m. (43in boost)	90 kt I.A.S.	90 kt I.A.S.
Max. speed at 2,900 r.p.m. (38in boost)	83 kt I.A.S.	87 kt I.A.S.
Max. speed at 2,800 r.p.m. (35in boost)	76 kt I.A.S.	79 kt I.A.S.

(Left) The stretcher-loading door on the port side of the nose section. (Right) "The cabin is much re-designed to give side-by-side seating—with dual control if needed—in front . . ."

The Bristol Freighter Mk 32 "Vigilant" seen at Rotterdam on October 1 after completing the inaugural Air Bridge flight to Holland.

Across the Bridge to Rotterdam

New Air Services to a New Airport

"Flight" photographs

SIXTEEN years after the event is too short a time to erase the memory of Rotterdam's previous sinister association with air power—an association lasting a brief forty minutes of the early afternoon of May 14, 1940. During this period practically the entire centre of the city and much of the port was destroyed and the name of Rotterdam became indelibly linked in the memory with the devastating effects of saturation bombing.

Since that time a new centre of Rotterdam has appeared—cast not in the mould of the old city, but functionally modelled by a co-operative effort of well co-ordinated planning in a contemporary and aesthetically pleasing style. The port, too, has now regained its position as the third largest in the world, serving both Germany and Switzerland *via* the Rhine as the largest single continental outlet to the sea.

It was with such thoughts in mind that *Flight's* representative boarded the Bristol Freighter G-ANVS *Vigilant* to cross by the inaugural flight from Southend to Holland on the "Air Bridge"—a term coined by Air Charter, Ltd., to describe their passenger-freight-car ferry services to the Continent. The flight to Rotterdam—which took 1 hr 4 min from wheels-off to wheels-on, landing at 12.17 p.m.—had an additional significance, for it was timed to coincide with the official opening of the new Rotterdam airport, which has been built to replace the war-destroyed airfield at Waalhaven.

We left the Freighter to find the airport *en fête* for the occasion; an excited crowd milled around, light aircraft towed long advertising banners while others dropped carnations, with greetings attached, on the heads of the delighted spectators. In the meantime, Mr. A. Milhado, a Dutch radio commentator in London, set off in some haste in one of the two vehicles which had been disgorged by the Freighter. He arrived a few minutes later at Rotterdam town hall, having proved (to win a wager) that it was possible, by making use of the Air Bridge, to drive from the Mansion House, London, to the centre of Rotterdam in under three hours.

The airport opening ceremony was performed by Mr. J. Klaasesz, Queen Juliana's Commissioner for the province of South Holland, and the guests, who included the mayors of Ipswich and Southend and General Aler, president of K.L.M., were welcomed by the Burgomaster of Rotterdam, Mr. G. E. van Walsum, L.L.D. The Mayor of Southend had flown to Rotterdam that morning in a Dove of East Anglian Flying Services, which was making its inaugural flight on the Southend-Holland service. Among the speakers at the opening was the Rotterdam Director of Public Works (and the engineer largely responsible for the project), Mr. J. A. C. Tillema, who explained that Rotterdam had no call for intercontinental traffic but that it did need an airport intended for short-haul air traffic to other parts of Europe.

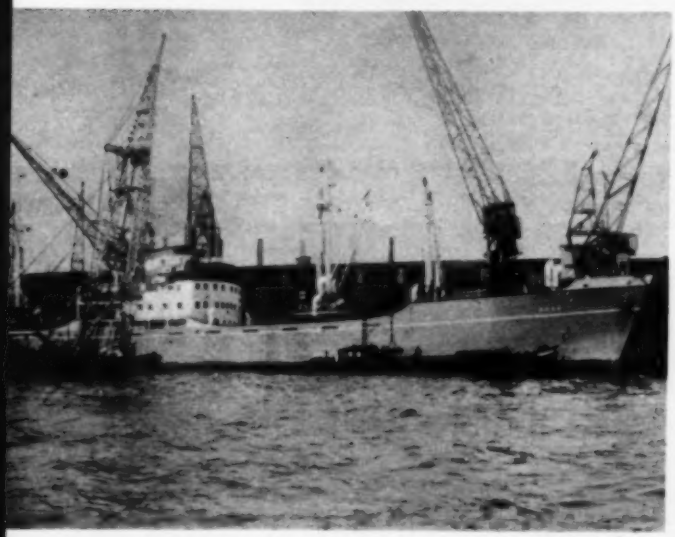
Within the limits stated by Mr. Tillema, the airport, which has the distinction of being the lowest in the world (it is 18ft below sea level) has been excellently prepared for its purpose. The runway has been laid NE-SW in view of the prevailing wind direction and should prove suitably placed (taking account of a permissible 15 m.p.h. cross wind component) for nearly 92 per cent of all landings. The Dutch soil is unsuitable for the earth-binding runway making technique that has been adopted at the British terminal of the Air Bridge at Southend, and the Rotterdam strip is concrete—4,250ft long and 150ft wide—and has a load bearing capacity equal to that of an I.C.A.O. Code Five runway (single isolated wheel load 30,000 lb). Nor have the taxi-ways and hardstandings been stinted—a considerable margin of width has been left for eventual expansion.

The surrounding grass area, which measures 930 yd by 710 yd, can be used by light aircraft with tyre pressures not exceeding 30 lb/sq in; and plans are in hand for the National Aviation School, who are concerned with private flying training, to operate and to have buildings of their own—including a link trainer room, hangars and a dormitory—on the airfield.

In the flat countryside of Holland, airfield approaches are not encumbered by natural hazards and the V.H.F./D.F. and non-directional beacon are probably adequate at this stage of the airfield's development; although Air Charter, whose Freighters are

The control tower (left) and the passenger building (which contains a bar) are both pleasant and functional. They will eventually be replaced by a single, larger terminal building, and additional facilities will be added as the airport develops.

A welcome visitor at the airport's opening day was Scottish Aviation's Twin Pioneer. Air freight services to Rotterdam are an innovation that will supplement much of the vast tonnage—some is seen being unloaded here—that arrives every day by sea.



equipped for I.L.S., would like to see the corresponding ground equipment installed later on. Among the development plans for the airport are the replacement of the gooseneck flare lighting with permanent electrical equipment (the pits have already been built into the runway) and extension of the passenger handling and control buildings. The existing facilities, although modest, are very attractive and customs and immigration delays should be as brief as cross-channel passengers by air have come to expect. Our own experience—based upon Dutch hospitality which insisted on some welcoming coffee in the offices of Rotterdam-Air (the company formed to handle the ground arrangements of the Air Bridge in Holland), and quick despatch of our baggage to a local hotel—was rather more informal than even the Rotterdam customs authorities might really condone; and a pleasant but rather harassed official later sought us out to request that our passports could be stamped.

The garden-party opening day of the airport and the U.K.-Holland Air Bridge was accompanied by much aerial activity. A large number of light aircraft, among them a formation of yellow-painted Dutch Tiger Moths wearing large dorsal fins, were parked on the grass and an excellent display of precision formation flying was given by three Dutch Harvards. A highlight of their show was a fly past with the wing men in steep side skids, so that the formation formed a flattened "U." Another first-rate display was that given by the Kolibrie H-3 ramjet-powered helicopter which cavorted in a series of vertical circles in front of the terminal building. Two of these helicopters, differing slightly in detail, are now flying. They were assembled at the airport in the Nederlandse Helicopter Industrie's building.

Apart from Air Charter, whose inaugural Air Bridge service occupied much of the limelight, both Morton Air Services and Channel Airways (East Anglian Flying Services) will operate Doves into Rotterdam, and they took care to catch the public eye by having their aircraft on display. Morton, who fly from Croydon to Rotterdam, have established an organization at the new airport known as Air Despatch to facilitate the ground handling of their services. Cambrian Airways' Heron, which made an attractive sight on the tarmac throughout the day, brought another reminder from the independents that they were alive to new business opportunities.

Showing the flag with considerable gusto were Scottish Aviation, whose Twin Pioneer (in the gay colours of Swissair) was prepared to demonstrate just how little of Rotterdam's runway it needed to become airborne, and Fokker's stately Friendship—which made several graceful circuits to prompt the recollection that the native aircraft industry was offering strong competition in the short and medium-haul field. Both aircraft are well suited to operation from Rotterdam, which has at present been restricted by the Dutch aviation authorities to aircraft of less than about 45,000 lb weight. Also on display near the offices of Rotterdam-Air were a Turbulent, the sales of which were being promoted by an importing company, and a towed "gyro-glider" of extreme lightness and simplicity manufactured by the Delft firm of Prinsen.

The opening festivities were due to be extended until Wednesday, October 3, when it was intended that a reciprocal visit should be made by Dutch civic dignitaries to Southend for an afternoon tour of the airport followed by a dinner and sightseeing expedition in the evening.

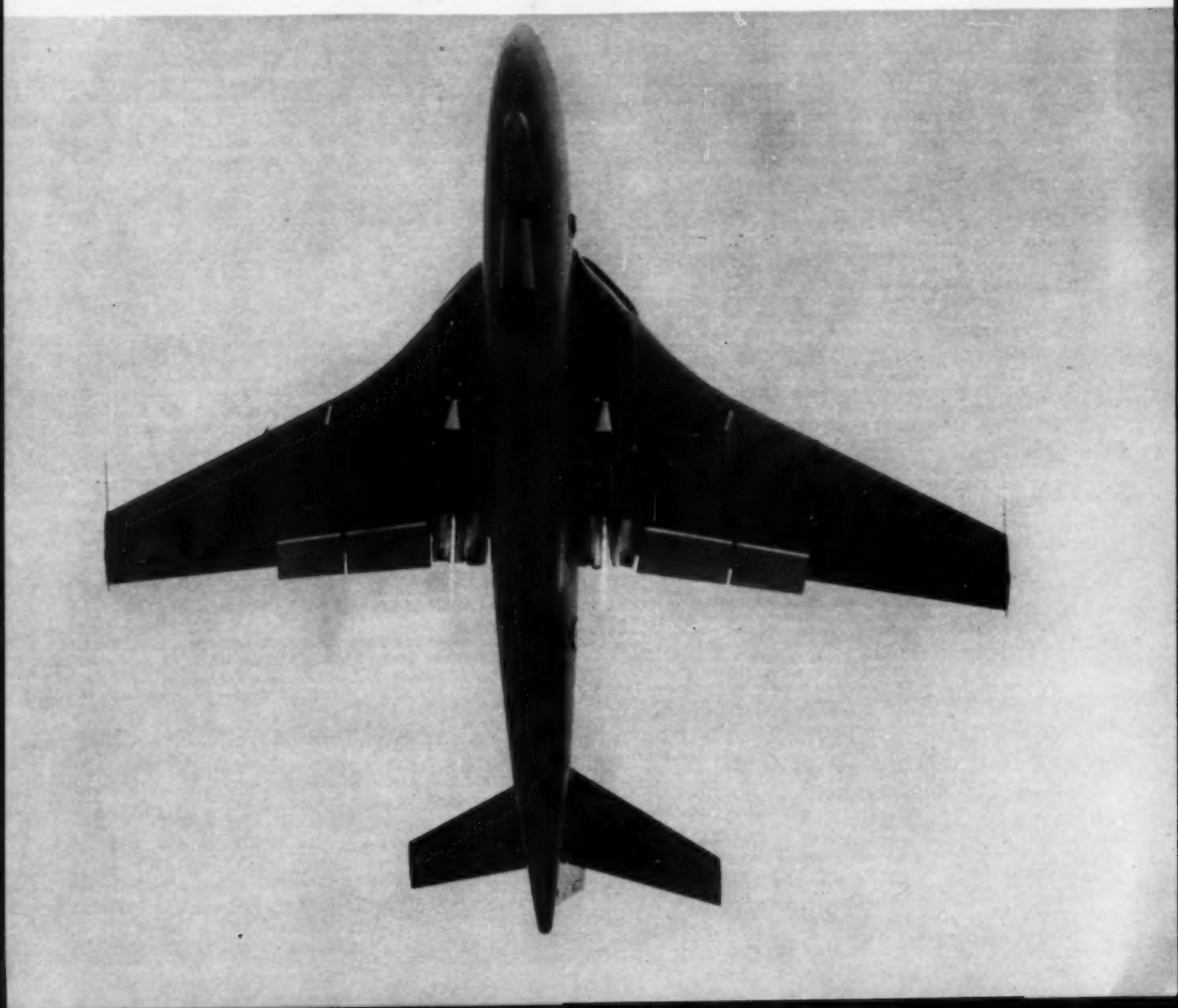
It may perhaps be queried whether an opening on this scale was either timely or justified. There can be little doubt that although other car air-ferries and services to the Continent already exist, there remains a need for a service which will enable Hamburg, Hanover or the Ruhr to be reached in a comfortable day's journey from London. It has also frequently been demonstrated that the time saved by flying across the Channel continues to attract an increasing number of passengers in spite of the additional expense; and the considerable reductions in processing time that accrue from the high frequency of operations by the independent carriers is, they claim, attracting custom to airports such as Southend (which in terms of motoring time is little further from the centre of London than London Airport). The choice of Rotterdam airport as the terminal of the Air Bridge is a logical one; Rotterdam is an important port and industrial city and the airport lies on the arterial road running from Amsterdam to The Hague, Rotterdam, Antwerp and Brussels. It is sufficient perhaps to comment that Rotterdam, apart from providing Southern Holland with an airport that can be used to replace Waalhaven for flying training, is fed by the combined winter services of three British companies operating a total of eight round trips daily. Two are Morton Air Services' Dove flights from Croydon, four are Channel Airways' Dove services from Southend, and two are passenger, freight and car-ferry services by Air Charter's Bristol Freighters.

The plebian, unromantic centre of commerce that Dutchmen sometimes claim Rotterdam to be is nevertheless the major European gateway to the seven seas, and some measure of the determination and effort which were required to restore to its former magnificence the great port on the New Maas river were in evidence in the rapid construction and logical planning of Rotterdam airport at Zestienhoven. To build and to enjoy work is an integral part of the Dutch character; and if it is accepted that controlled expansion is one of the keys to commercial success, Rotterdam airport has a bright future before it. A.T.P.

This well-finished Druine Turbulent displayed outside the offices of Rotterdam-Air, the ground handling company associated with Air Charter, attracted considerable attention.

THRUST

ONE of the fundamental laws of propulsion is that the higher the velocity of a propulsive jet, the greater will be its thrust for a given mass flow. No other jet propulsion prime mover can match the efflux velocity of the rocket and such units can therefore produce very high thrust from a modest compass. Three of the accompanying photographs show various aspects of rocketry. On the left is an unusual and striking view of the contrail of the Canberra test bed for the Napier Scorpion rocket motor. Above is the impressive launching of a Martin Viking research rocket for the U.S. Navy; this vehicle, weighing 7½ tons and powered by a single, 21,100 lb thrust chamber, reached 144 miles altitude. On the right is a "Flight" photograph of a Vickers-Armstrongs Valiant taking off with assistance from two de Havilland Super Sprite rocket motors. The final photograph shows a supersonic jet from the afterburner nozzle of the Allison J71 turbojet of a McDonnell F3H-2N Demon.



THE AERONAUTICAL BOOKSHELF

"Alas Rojas Sobre España," by Miguel Sanchis. Publicaciones Españolas, Madrid. Illustrated.

THIS is another work in the series *Temas de España Ante el Mundo*. Written by Don Miguel Sanchis, it gives a complete and comprehensive review of aircraft flown by the Republican forces during the Spanish Civil War. This was, of course, the side which, supported by the Communists, was eventually defeated by the forces of General Franco.

The writer makes no bones about expressing downright disapproval of the aims, methods and efficiency of the "Red" forces, but he gives a most detailed review of the strength, battle order and sources of supply of their aircraft throughout the conflict. A truly amazing collection of types is listed and illustrated, including those of British, American, French, Russian, German, Dutch and Spanish design and manufacture. We are told of Bristol Bulldogs supplied by Czechoslovakia, "Chatos" and "Katiuskas" from Russia, D.H.60 Moths and Monospar ST-25s from England, and Grumman G-23 Delfins and Lockheed Orions from America. For the historian with ability or facilities to translate Spanish this will be a work of surpassing value.

"The Brabazon Story," by Lord Brabazon of Tara, G.B.E., M.C., P.C. William Heinemann, Ltd., 99 Great Russell Street, London, W.C.1. Illustrated. Price 25s.

"THE great Brabazon is a remarkable figure." These are the words the author of this book, were he somebody else, would undoubtedly have used in describing his subject. His autobiography is unusual, as is to be expected of a man who has lived such an unusual and full life.

There is little call for his introductory apology for having written it, or for the style in which it is written. To anyone who knows Lord Brabazon it is clear that there has been no "ghost" writing; if one can close one's eyes to all except the printed word it is easy to see and hear him delivering every passage. I suspect that he dictated a good deal of the material, but it has the entertaining, authoritative ring of his talks and speeches; and it also reveals a clear and accurate memory for events which took place as early as the beginning of the century.

It is indeed a remarkable thing not only to have seen the birth of three inventions that have changed the world, but to have taken a leading part in their development and adoption. It would have been a great loss had Lord Brabazon's personal recollections of events and people in the early days of motoring, flying and wireless not been recorded. The fact that his reminiscences are woven into an intriguing story—"romance" might be the better word—with an eventful life in sport, politics and industry as the connecting theme, makes the whole entertaining as well as instructive.

I enjoyed *The Brabazon Story* very much indeed and recommend it without reservation. It seems appropriate that this review is being written in a quite small aeroplane—a Heron—flying north over country which "Brab" must have crossed in balloons and later in early powered flying machines.

There is no obvious theme to this book, although the words of advice and warnings which crop up seem to suggest that a common fault is to attempt too little in one's life, rather than to take on too much. On reaching the last page, I had decided that Lord Brabazon likes, and is tolerant of, his fellow-men if they have character, but that he has no time at all for a bore. On turning to the first page of his "Afterthoughts" I found this confirmation: "To be a bore is an unpardonable sin." It is one of which "Brab" himself will never be guilty. Here, by way of confirmation of that statement, are a few typical extracts from the book:—

"I well remember also my second ascent. . . . Now the first thing you should do when you get up in a balloon is to let the trailing rope out. This is a rope about a hundred yards long and fairly heavy, and the function of it is to take the weight off the balloon when you come down, for of course the more rope there is on the ground the less you are carrying, and as it trails along the ground it delays your forward velocity. You should get this rope out as soon as you can. We didn't, with the result that I had to call Huntingdon's attention to the fact that we were coming down rather quickly and that he ought to throw out ballast. But he wasn't quick enough, and we hit the top of a house in the East End and knocked off the chimney-pots."

Then there is his pen-portrait of the Hon. C. S. Rolls:—

"Charlie Rolls was the strangest of men and one of the most lovable. He was tall and rather thin, and his eyes stood out of their sockets rather more than is normal. He was rather fond of a Norfolk jacket—a thing you seldom see nowadays—and always wore a very high, stiff, white collar. He'd look a bit odd today, but at that time this kit was in no way absurd. While motoring he would turn his cap back to front."

Recalling an early "heavier-than-air" flight in 1909, Lord Brabazon writes:—

"While in the air, I was suddenly struck by a powerful side-gust of wind. The whole aircraft, of course, tipped sideways, and the impact was so sudden that I had no time to do anything but try to correct my position in the air by heaving on the rudder control. This I did, but in my anxiety I proved a little over-zealous, and suddenly discovered that the control to the rudder had broken. . . . There was nothing to be done but glide down—canted at an angle of about 35 deg—and this I did. . . . Suddenly I struck the ground heavily on the top of the left-hand wing . . . wires and struts snapped viciously . . . the engine left its moorings and came hurtling through the air from behind me . . . but through good fortune I wasn't personally damaged and recovered to find myself being licked by my two dogs, who had chased after me during the flight."

Of a subsequent experience he writes:—

"In winning the Michelin Cup I naturally left the engine on full bore, which was the practice of the day, and this resulted in a steady climb which took me to about 500ft. I never have liked heights and this alarmed me very much. . . . Any really violent bump—and there were plenty of them—left you with the sensation that you were singularly insecure and that at any moment you might be thrown out the machine. . . . As I rose higher and higher I didn't like it at all, for I had the elevator full forward and even with it in that position the machine was still climbing. So for the first time in an aeroplane I carried out what I thought was a most daring and original manœuvre: I throttled back, still keeping the engine going, and slowly descended to a height which I considered decent—about 80ft."

In conclusion, the logic of the following seems irrefutable:—

"If anyone were to ask me to advise some young man on the ideal training he would need to become a successful business magnate, I think I should tell him to become both a fully trained engineer and a fully trained chartered accountant. Since he would be unlikely to earn any money before he was 30, even if he had the talents, I can scarcely imagine that my advice would be taken."

M. A. S.

"East of the Sun," by Nancy Pence Britton. William Blackwood and Sons, Ltd., Edinburgh. Price 12s 6d.

NO flying at all here, but none the less a book likely to be enjoyed by almost anybody who has served at R.A.F. Changi; it will certainly entertain their wives. The American-born wife of a group captain, Mrs. Britton writes with insight and wit of the day-to-day problems of Service wives on an overseas station. The problems embrace the local insectivora, including "millipedes, the large economy-size version of the centipede. When eight inches of this marched towards us under the door, swaying from the hips and all feet in step, even Frank almost took to the table top. A little booklet we had, with the unfortunate title 'Jungle Survival,' said that millipede bites were rarely fatal, but I didn't care for that word 'rarely' ".

OTHER BOOKS RECEIVED

He.1000, by Ernst Heinkel. Hutchinson and Co. (Publishers) Ltd., 178-202, Great Portland Street, London, W.1. Price 30s.

Practical Solution of Torsional Vibration Problems: Vol. 1, Frequency Calculations, by W. Ker Wilson, D.Sc., Ph.D., M.Sc., Wh.Ex., M.I.Mech.E. Chapman and Hall, Ltd., 37 Essex Street, London, W.C.2. Price 105s.

U.S. and Canadian Military Aircraft, by John W. R. Taylor. Ian Allan, Ltd., Craven House, Hampton Court, Surrey. Price 3s 6d.

Continental Military Aircraft, by John W. R. Taylor. Ian Allan, Ltd., Craven House, Hampton Court, Surrey. Price 3s.

Pioneer Airmen, by Laurie Cade. Frederick Muller, Ltd., Ludgate House, 110, Fleet Street, London, E.C.4. Price 7s 6d.

Aircraft Gas Turbines, by C. W. Smith. Chapman and Hall, 37, Essex Street, London, W.C.2. Price 70s.

Solution of Problems in Aerodynamics, by S. A. Urry, B.Sc.(Eng.), A.F.R.Ae.S. Sir Isaac Pitman and Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 32s 6d.

Survivor's Story, by Air Marshal Sir Gerald Gibbs, K.B.E., C.I.E., M.C. Hutchinson and Co. (Publishers), Ltd., 178-202 Great Portland Street, London, W.1. Price 18s.

"The Aeroplane" Directory of British Aviation, 1956. Compiled by the staff of *The Aeroplane*. Temple Press, Ltd., Bowling Green Lane, London, E.C.1. Price 21s.

The Sky and I, by Veronica Volkersz. W. H. Allen and Co., Ltd., 43 Essex Street, London, W.C.2. Price 12s 6d.

The Springboard, by John Fores. Hodder and Stoughton, Ltd., Warwick Square, London, E.C.4. Price 12s 6d.

Selected Combustion Problems, II AGARD. Butterworths Scientific Publications, 88 Kingsway, London, W.C.2. Price 90s.

Airplanes of the World, by Douglas Rolfe and Alexis Dawydoff. Simon and Schuster, New York.

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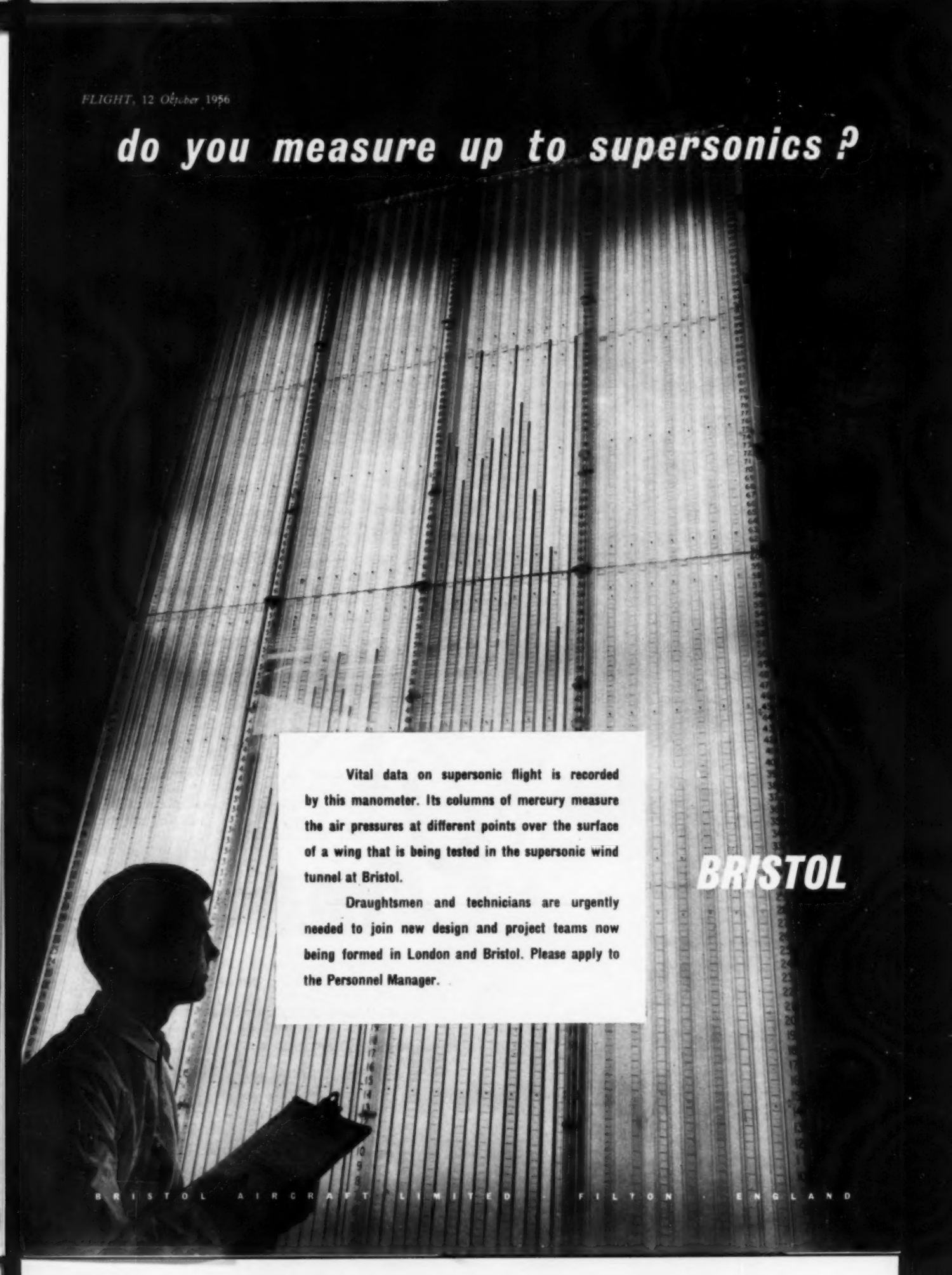

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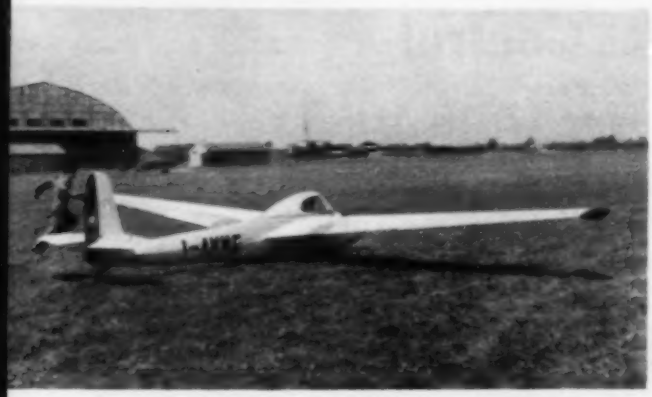


New and Italian is the A.V.M. Gheppio, a 10½-metre single-seat sailplane built by Associazione Volovelistica Milanese and designed by Ing. Gianfranco Rotondi. Of all-wooden construction, the aircraft incorporates a sliding canopy; empty and loaded weights are 92 kg (203 lb) and 182 kg (401 lb) respectively and the best flying speed is 80 km/hr. Wing sections employed are NACA 4415 (root) and NACA 2R12 (tip).

CLUB AND GLIDING NEWS

DUAL and solo flying on Elstree Flying Club's new Chipmunk 22, G-AOSY, will be at the rate of £4 15s per hour. The machine is fully equipped for night and instrument flying and is fitted with four-channel V.H.F. radio. With the winter evenings ahead it is hoped to start more energetic night-flying activities again; this year pupils will have the choice of four types (Autocrat, Magister, Chipmunk and Gemini), although the club normally allows a maximum of only two aircraft on night circuits at the same time. John Schooling, who has been instructing on a part-time basis at Elstree throughout the summer, has been engaged as an additional instructor. Flying hours for the first nine months of 1956 total over 3,000.

THE annual report of the Royal New Zealand Aero Club for the year ended March 31, 1956, discloses that there were at that date a total of 28 individual member-clubs. During the year just over £15,000 was paid to clubs under the new Government-assistance scheme, over half of which was payment at the rate of 7s 6d per hour on club flying, the remainder consisting of grants to pilots on gaining P.P.Ls and direct payments to the clubs. With the introduction of the new scheme, the report states, a revival has come of the enthusiasm of pre-war days.

"Training for Service flying is no longer carried out by clubs," the report continues, "and the purchase of more modern types of aircraft, joined with Government assistance in reducing the cost of flying to individuals, has resulted in greatly increased interest to those of the public wishing to learn to fly. Closer attention by clubs to better utilization of their aircraft is resulting in more economical operation. . . ."

DESPITE the worst summer weather for a great many years, the newsletter of the Vickers-Armstrongs (Hurn) Flying Club reports that members have put in a great deal of flying, culminating in the magnificent figure of 260 hours flown during August. This brought the total hours up to 728, and the number of P.P.Ls obtained up to 18 out of a membership of 33. Several pilots are now being converted to Austers in order to take the load off the Tigers as much as possible, and it is intended to train all pilots to fly both types eventually.

AT the recent annual general meeting of the Armstrong Siddeley Flying Club (P.F.A. Group No. 23), it was reported that 270 flying hours had been logged during the preceding twelve months on the club's Tipsy Trainer G-AFSC. The club committee for 1956-57 comprises R. A. Christmas, chairman; H. Bennett, secretary; P. Walker, assistant sec.; B. Adams, treasurer; C. Reeves, assistant treas.; C. Millhouse, engineer; S. F. Clarke, club organizer; and C. G. Jaynes, press relations.

SURREY Flying Club members Mike Young and Don Probyn have recently obtained their Commercial Licences, after learning to fly *ab initio* and gaining their P.P.Ls with the club. They are now flying with Airwork and B.E.A. respectively.

DURING September, the Scottish Aero Club at Perth was prevented from reaching the 200-hour total by fog and other foul weather. The club was represented at the recent Grand Prix de France, and the month's achievements include P.P.Ls gained by members Parnell and Shrigley and by three cadets.

INTER-CLUB co-operation resulted in Denham Flying Club using one of Elstree's Magisters recently when the Elstree club was closed for the annual holiday and there was a gap in the Denham fleet due to C. of A. overhaul. Denham's flying hours for September showed an increase of 30 over those for September 1955.

ON Sunday, September 30, a meeting was held at what must be one of the most historic flying sites in this country. The occasion was the official opening of the new hangar erected with the generous help of the Kemsley Flying Trust for the Southdown Gliding Club, at Firle Beacon, on the downs overlooking Alfriston. After a few words of welcome by the president of the club, John Furlong, the ceremony was performed by Lady Gage who knocked on the doors of the hangar—which were opened with alacrity. Among the 300 people present were three former presidents of the club. The senior was Viscount Gage, who was the president over 20 years ago and who first flew at Firle Beacon during the famous international gliding meeting in 1922. The site forms part of Lord Gage's estate and it was due to his kindness that the club was able to move back here in March 1955.

The other two presidents were Mr. S. G. Stevens and Marshal of the R.A.F. Sir John Salmond. Among the other guests, a number of whom came from various other clubs, was Mr. York Bramble, a founder-member and former secretary of the Southdown Club.

After tea had been served in the hangar, two-seater flights were given to the visitors. Lady Gage was flown by Hugo Trotter, the chairman of the Surrey Club, who had brought a Slingsby T.21 and a large party over from Lasham the previous day. Although the day was fine, little soaring was possible. Philip Wills, flying his Skylark 3, was able to stay aloft considerably longer than any other pilot, however. He had attempted to fly from Lasham to Firle the previous day but was forced to land at Lewes, only a few miles short of his goal.

WITH the beginning of the Michaelmas term at the College of Aeronautics, Cranfield, another year's activity has started for the College Gliding Club. During the last academic year, the club aircraft logged a total of 785 winch launches, a number of aerotows, and 94 hours' flying. The club has a continually changing membership, the majority of its new members at the beginning of each session having no previous flying experience. Flying is normally limited to week-ends during term time, giving a maximum of sixty flying days each year in addition to two vacation camps at hill sites.

A Slingsby T-31 Tandem Tutor is used for *ab initio* training, subsequent hours being logged on the club Tutor, which is fitted with a fully enclosed cockpit canopy. From the Tutor, pilots graduate to the Olympia, which was acquired at the beginning of this year

With a membership at the end of the summer term of only 31, five "C" certificates have been gained during the past year in the Tutor. During one attempt this aircraft was soared to within 400ft of "Silver C" height. Six "Silver C" legs have also been obtained during this period. For the session just starting, a record membership (including a number of experienced pilots) is expected.

Plain Words on Traffic Control

A Hard-Hitting Report on Britain's "Inadequate" System

Mr. K. I. Pearson, chief control officer at Farnborough, who presented the Guild's report.

AS recorded on page 625, the Guild of Air Traffic Control Officers last week held its first convention. We reproduce here a synopsis of the technical committee's report, read by Mr. K. I. Pearson, on the present "very sick" state of the air traffic control system in this country.

IN his opening remarks, the speaker said that, despite its youth, the Guild was rich in the experience of its members who, being mostly ex-aircrew, were not unaware of the problems as seen from the cockpit. The Guild had, therefore, been able to review the present situation through adult eyes, and to put forward its point of view in the hope of hastening "long overdue changes in procedure, and of spurring scientific effort along the road to providing the right equipment at the right places at the right time."

Hundreds of thousands, indeed millions, of words had been written and spoken on the subject of air traffic control. How rare it was to pick up an English-language aviation journal without finding in it a criticism of the civil and military A.T.C. systems which existed today. "How many papers," the speaker asked, "have come from the Ministries? How many suggestions have come from aircrew? How many sound ideas have died due to lack of official support and understanding? Why, you may ask, are we sowing more seed on this barren unproductive ground? It is because we intend to see it grow. We shall not relax in our endeavours."

Lives were at stake: not the lives of the planner or of the air traffic control officer, but the lives of people who put their trust in the controllers' ability and methods. "We consider," said the speaker, "present-day air traffic control methods to be out-dated, and incapable not only of handling existing traffic but, more serious still, incapable of being developed or extended. We consider that equipment is obsolescent even before it is installed." The system suffered from a lack of planning, and had come to be "an organization to please the administrator." It was a mere synthesis of lines on a map; acts, orders-in-council, and instructions designed not to help the pilot but to "prove the impeccability of its creators" in the event of an aircraft accident. "Let us," Mr. Pearson continued, "examine the patient a little more closely, for he is very sick."

The individual controller was now so "saturated" as to be dangerously near the limit of coherent thought and action. A further symptom was lack of flexibility, by which was meant the rigidity of a system which demanded huge areas of air space to be sterilized, but had no answer to the fact that with present-day navigational aids this could never be achieved, yet continued to operate as though it had. QGH airways based on M.F. ranges and procedural control had as much claim to existence today as the dodo.

The Glaring Fault

John Citizen, the average fare-paying passenger, saw enormous posters along the road to London Airport, assuring him that Britain had the finest air fleets. He was almost bursting with pride that his country was the first to operate turbojet passenger transports, and was still the only producer of turboprops for service in any numbers. He saw the magnificence of the buildings at the airport, and there was no question in his mind about the efficiency of the aircrew and cabin staffs. "Would he be justified in assuming that behind all this there exists a ground organization to which as much scientific and financial effort has been directed to ensure that his flight would be as safe as human endeavour could guarantee? He would not indeed." How much good the vast sum of taxpayers' money lost through traffic delays could have done had it been spent in research over the last ten years! Manufacturers battled in the field of radar to the extent of variously producing sets operating in the 3 cm, 10 cm and 50 cm bands, each claiming that he had achieved exactly what was required by the traffic control officer. The logical approach should have been the appointment of a working party to investigate the requirements. While the sales-battle raged, and they were urged to use so-and-so's radar because it contained "Tweenscan" —on a level no higher than that of a toothpaste advertisement— aviation was reduced to a snail's pace to maintain safety.

"The glaring fault, we feel, is the annexation of 15,500 sq miles of the United Kingdom's 58,000 sq miles total, labelling it 'controlled airspace' and demanding that the military should uphold its sanctity." It must have been obvious from the start that this was an impossible fundamental, due (a) to the lack of navigation facilities to achieve it, and (b) to the vast amount of *ab initio* and continuation training by the Services. When these controlled airspaces were raised from 11,000ft to 20,000 or 25,000ft, it would reduce the problem to a level of absurdity, for "how in the name of sanity can a pilot of a Hunter, whose mind is perhaps loaded to the limit and whose ground speed may be ten miles a minute, be expected to know whether he is infringing a controlled airspace?" What an impossible situation for the Service it was.

Obviously, to achieve changes, some things should logically take precedence over others. The Guild's first proposal was that it should be a statutory requirement for every air traffic control officer to be licensed. "This could, and in our opinion should, be introduced at the earliest possible time."

Having ensured the efficiency of the man, we were left with improvements to operations and methods. Dealing first with methods, proposals for their improvement were divided into short- and long-term categories.

First, short-term. A method must be found to co-ordinate available information on military and civil flying. The present system in which military and civil controllers were physically separated led to gross inefficiency where spheres of control overlapped. There should be only three control centres in the United Kingdom, embracing Scotland, the Midlands and the South, with modifications if necessary to suit the military requirement. Each centre should have full use of all available radar with microwave-link presentation, and there should be joint centres of military and civil control to destroy once and for all the gulf at present between them, which was strewn with prejudice and mistrust, engendered solely by ignorance of each other's task.

Automatic Presentation

The next short-term task should be development of presentation of the necessary information to the controller. There must be an end to the "telephone complex," and we must turn to the scientists to find ways of presenting the controller with the basic data relating to every aircraft under his control—height, heading, position, and speed. "We would state categorically our intention that a control officer, whether at an aerodrome or a centre, should be required only to look, to listen, to interpret and to talk. Other agencies must be provided to record and present."

This led to the Guild's first long-term proposal. We must arrive at a system whereby a flight proceeds according to a predetermined plan. The information concerning it should be continuously fed to a controller who would only transmit and receive messages in the event of departure from flight plan, danger from conflicting traffic, or during the approach and landing if necessary.

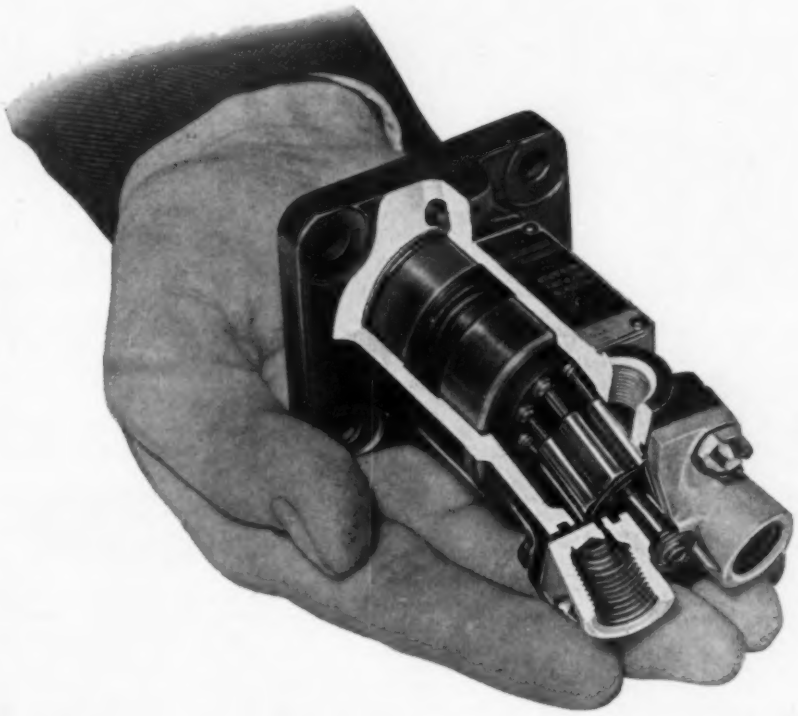
On the subject of operational improvements, the speaker said that by the very nature of their tasks, it would always be necessary to "canalize" civil aircraft and to permit the "scatter" of military aircraft. How were the two to be reconciled? The military problem, as they saw it, fell under five headings; (1) operational; (2) research and development (including the manufacturers); (3) pure training; (4) continuation training and (5) general communications and transport. The first was inviolable, and could be integrated with civil requirements if the proposals on joint centres were accepted. The second should be allocated to specific areas with control by a separate authority within those areas. The third should ("at the risk of being taken to task for trying to decide Service policy") be carried out in the Commonwealth. The fourth should be restricted to specific areas with a degree of control to be decided by the Service. The fifth should follow civil procedures.

In items (2) and (3), therefore, they were proposing the complete reversal of the system as accepted today, namely that the necessity for controlled airspace was admitted, but that it should be controlled by the military, and civil aircraft should not fly into it except by clearance. The Guild advocated complete freedom for private aircraft without radio at the lower altitudes except in the vicinity of airports and in Service low-flying regions.

Finally, there was the fundamental requirement—improved navigational aids. The pilot must be able to ensure an accuracy of navigation to within the narrowest tolerances of time and distance. At the same time the air traffic control officers must have continuous and up-to-the-minute information made available to them by means other than R/T.

Looking to the future, the report said: "Ultimately there must be only one air traffic control service, a 'Trinity House of the Air,' charged with the safety of our country in the same manner as that noble corporation has guaranteed the safety of our home waters for the last 450 years."

We hand it to you . . .



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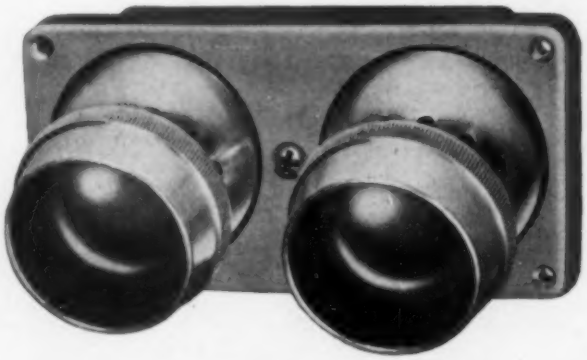

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Air Atlas have three DC-4s, one of which is seen at the company's base at Marakech, Casablanca, one of the finest airports in North Africa.

MOROCCO-BOUND

The Story of Air Atlas

By FRANK ILLINGWORTH

AIR Atlas—Air *Maroc*—has launched a drive to increase passenger traffic between Morocco and Spain, France, Western Germany and Switzerland.

The main cities of the new kingdom of Morocco are plastered with Air Atlas posters advertising holidays in Western Europe, and the company is shortly to embark on a come-to-Morocco campaign in Europe. This airline of mixed private French and Moroccan State ownership, though small, is alert for possibilities and is calculated to take at least some passenger traffic that would otherwise have fallen to B.E.A.

The B.E.A. drive to use Gibraltar as a stepping-stone not only for the south of Spain but for the International Zone of Tangier gained considerable momentum during the summer. One sees scores of B.E.A. come-to-Britain pamphlets and posters in Morocco and Tangier; and in Britain, Spain, France and Switzerland potential holidaymakers are being charged to fly to Morocco *via* Gibraltar.

B.E.A. carried 12,000 passengers to the Rock this last twelve-month, and in Gibraltar itself preparations have been made for an expected increase in visitors during this autumn and winter. But Air Atlas has at least some advantage in that its Europe-Morocco services do not entail a change at Gibraltar.

For my recent month's flying tour of Morocco I chose the Gibraltar route, joining Air Atlas at Tangier. This airline employs DC-4s on its schedules to Madrid, Paris and Geneva, and DC-3s on its internal routes and those to (for example) Algiers. It also uses DC-3s on its services Tangier-Valencia, -Perpignan, -Toulouse, -Marseilles, -Lyons and -Nice, and DC-4s on the Tangier-Nantes and -Bordeaux schedules introduced last year.

This is a considerable expansion of services compared with those offered by Air Atlas as recently as 1949, when its Morocco-Europe services were restricted to schedules from Tangier to Valencia, Perpignan and Toulouse.

I was informed (privately, not by Air Atlas) that this line is considering extending its services east-and-north to Malta and Rome, when political conditions settle down in "this new Sultanate of Maroc," and possibly southwards to French West Africa and "other points south."

Of course, Air Atlas maintains regular schedules between all the main cities of Morocco: Tangier-Rabat-Casablanca, linking with the Tangier-Meknes-Fez triangle, in turn linking with Algeria and with the southern half of Morocco-Casablanca-Marrakech-Agadir, and runs charter flights for tourists who want to visit the oases of the Moroccan Sahara.

Tourism features considerably in the company's reckonings, but the main demand on its seats is by the French in Morocco, and French and Spanish on the Morocco-Europe schedules.

Fares and freight charges on the Morocco-Europe runs are, of course, comparable to other similar services. As for internal services, Air Atlas is obliged by the Moroccan Government to keep these low (receiving a subsidy against losses) "in order to promote air travel here." The result is a £4 fare for the Tangier-Rabat service (one hour), and £3 for the Casablanca-Marrakech service (a little under 1 hour).

The latter schedule is among the more interesting, for it spans patch-work plains dotted with walled villages (seen from 2,000ft, they resemble models in ochre-yellow Plasticine), crosses a range of desert-like mountains (outriders to the High Atlas, which rear in broken rock to 13,000ft) and ends on the French military airfield at Marrakech, a centre for air force training and a kingpin in the defence of Southern Morocco and Southern Algeria.

Seen from the air Marrakech itself is as pink as Sir Winston Churchill portrayed it; in the setting sun its buildings are almost red, its Shell fuel-storage tanks (normally metal-white) suffused with "alpine glow."

Aircrew who made forced landings hereabouts during the early

The Sultan of Morocco, H.M. Sidi Ben Yussif, disembarks from an Air Atlas DC-4 at Rabat Airport, Morocco.

MOROCCO-BOUND . . .

proving flights faced the possibility of unpleasant deaths at the hands of the Berbers. Today, thanks to years of French rule, the country outside the wild Atlas Mountains is well populated and normally safe for Europeans.

However, the Moroccan (Berber and Arab alike) is not proving particularly air-minded. Even the Eskimo and Arctic Indian, until recently largely untouched by full-scale air travel, quickly accepted air transport as the natural sequel to the dog-team; other native peoples have shown similar alertness to the possibility of air transport. But not the Moroccan. He prefers the camel, donkey or mule, or—in the cities—buses and trains.

For example, the Casablanca-Marrakech planes may carry only a handful of passengers. Those on my flight numbered only six: a veiled Arab woman, a veil-less and fair-skinned Bedouin woman, three lounge-suited Arabs, two robed Marokis (one with a gold embroidered turban), and myself.

But in July, when French women and children leave Marrakech and other towns in the interior to escape the excessive summer heat, and in October when they return, bookings are very heavy.

If on my Casablanca-Marrakech flight there were only six passengers, the return flight had been booked up seven weeks ahead, and of the 34 passengers I was the only male on an "out"-flight from Marrakech last month; the drone of the engines was a background to the wail of young children and the scolding of French mothers. There was not a Moroccan among us.

Points made to me at the Air Atlas head office in Casablanca included these: (1) Aircrew and maintenance are exclusively French and do not include Moroccans; (2) The airline is not contemplating switching away from DC-3s and DC-4s; and (3) despite the uncertainty of the political situation, Air Atlas is planning extension of internal schedules and the tapping of Europe's "tourist-potential."

(Below) Seen entering one of the company's six DC-3s at Casablanca is (in hat) Danny Kaye. (Right) A typical Berber village in the High Atlas Mountains, which are flanked by the agricultural areas of Morocco and, on the east, by the Sahara.

THE COBHAMS GREET THEIR FRIENDS

"ON the occasion of the 30th anniversary of Sir Alan's return from his flight to Australia and back on October 1, 1926, both he and Lady Cobham wish to greet all their friends in aviation through the years." So opened the programme for a memorable party held at the Connaught Rooms, London, on Monday, October 1. Some 350 people attended.

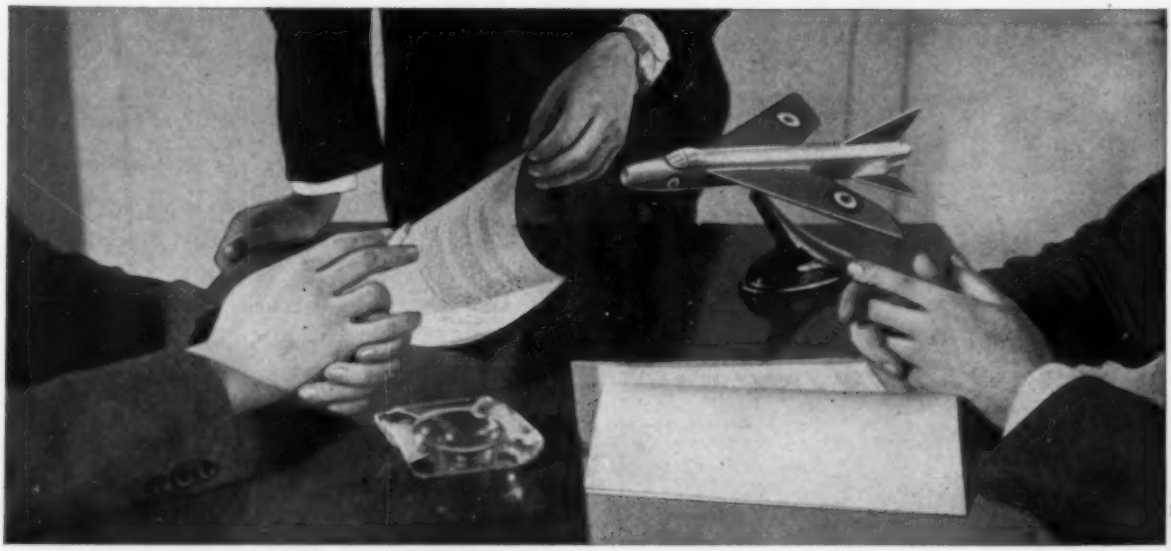
It is often said that it is impossible to recapture the past; but Sir Alan and Lady Cobham have done so many nearly impossible things in their crowded lives that it was not surprising that their attempt to relive the early days was completely successful. The gathering included all those one might have expected to see at an early King's Cup Race, and precious few of them looked in the sere and yellow: it might equally have been a celebration to mark the end of a season of barnstorming by Sir Alan's air circus. Together again, too, were people whose names have since become famous in the airlines which followed the routes pioneered by their host—pioneering done not only geographically but also in the sphere of flight refuelling.

The toast of "The First Flight to Australia and Back" was proposed by Viscount Bruce of Melbourne and responded to by Lord Sempill and Peter Masefield—all brilliant speakers. Viscount Bruce, who was prime minister of Australia when this epic flight was made, recounted the hazards of the journey, Lord Sempill expressed thanks for "the finest party I have ever attended," recalled Sir Alan's first charter flight with Sir Sefton Brancker to Rangoon and paid tribute to the late Lord Wakefield, who sponsored many of these pioneer flights. Mr. Masefield, pitting himself (as he said) "a mere Englishman against Australia and Scotland combined," recalled that he was only 12 years of age when "A.J." came back, but he remembered listening to the broadcast on a crystal radio set after carefully adjusting the cat's whisker. He offered the thought that if it had not been for the war, when money was no object and miles of concrete were laid down, following Sir Alan's lead flying boats would now be in use the world over. He also suggested that Sir Alan, more than anybody, had been responsible for putting British aviation on the map.

Sir Frederick Handley Page, proposing the toast of "Our Hosts," said he thought the party was the best example he had seen of flight refuelling and suggested that the function should have lasted two nights—with no speeches on the second one.

Sir Alan, in his reply, talked with all the same urgency and verve with which, 30 years ago, he had declaimed his beliefs in aviation. He spoke of sharing quarters with O. P. Jones when they were instructors together; of the first barnstorming with Holmes, when they were so excited at making some money, that they poured it over their heads out of a bucket; of buying D.H. 9s at £22 a time and selling them to de Havillands at Stag Lane for £97 10s each; of A. B. Elliott's death from a bullet fired by an Arab at the D.H. 50 seaplane as is passed over the Euphrates; of Turner Hughes and Geoffrey Tyson as aerobatic pilots in the air circus; of A. H. Johnson who flew the Giant Air Liner, and of a host of other events and people.

Outstanding in a memorable function were the tributes paid to Lady Cobham for the part she has played in 30 very busy years. No function ever had a more gracious hostess.



'...but our most urgent need is—MORE STAFF'

(Report of a meeting between the Chief Engineer, his Technical Assistant and his Personnel Officer)

C.E. As I see it, the problem is how to attract people by conveying some idea of our future plans without giving away secret information.

P.O. Haven't we first got to convince them that ENGLISH ELECTRIC intend to push ahead with the next generation of aircraft?

C.E. Surely they don't think that after all the work we've done on supersonic flight in general, and the P.1. in particular, we are just going to sit back and go out of business!

P.O. If we can't talk about the aircraft we are planning to build can we say something about the equipment we've got or are going to get?

T.A. For example, is it permissible to point out that our new tunnel has been designed for speeds up to Mach 4, and let people draw their own conclusions?

C.E. There's no reason why we shouldn't. And we can mention the new plant for testing structures and equipment at high temperatures nonstop for hours at a time. In fact we ought to talk about all our test installations.

P.O. Provided we don't thereby give people the impression that we are a great octopus in which the individual is swallowed up.

T.A. I've never yet heard a research man complain about the amount of equipment or the size of the resources at his disposal!

C.E. True, but it's worth pointing out that this Division is a self-contained affair of very reasonable size, with a colossal parent organisation behind it.

P.O. Which of course brings in all the other advantages like security of employment, opportunity for advancement, decent working conditions and help with the accommodation problem.

C.E. And remember we want all grades of D.O. and engineering staff—mechanical and hydraulic engineers, heat-transfer experts, metallurgists, physicists, aero-dynamics folk—the lot. We must look outside the aviation industry as well as inside. See if you can get something on paper for me.

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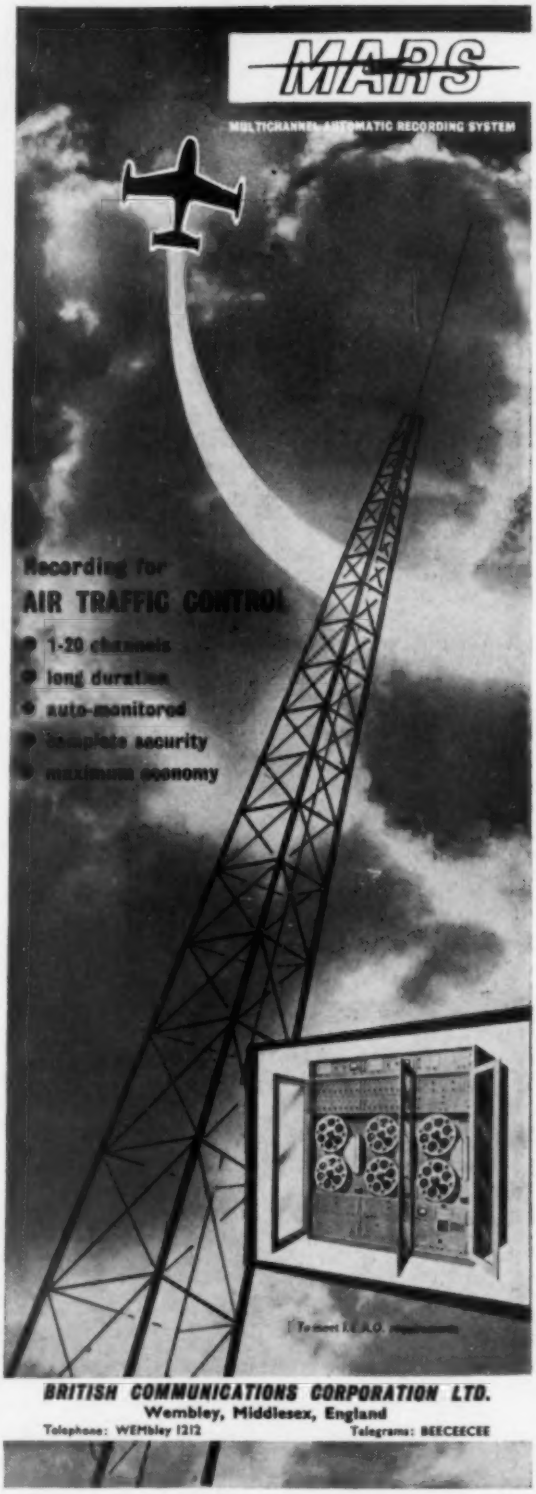

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CORRESPONDENCE

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns; the names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

Farnborough Bouquets

YOUR correspondent Mr. H. Joyce, with his bouquet for Blackbushe over the period of the S.B.A.C. Display (*Flight*, September 21), very much echoes the Society's sentiments.

Blackbushe Control does a magnificent job in facilitating the passage of guests to the Display, and it is with great pleasure that after each of the Farnborough Displays we have written expressing our gratitude and thanks to the Aerodrome Manager and his staff.

In highlighting what Blackbushe does for us, we must not overlook the tremendous effort made by all of those concerned in controlling the transport of guests and the public to and from the Display. We receive much valuable help from the Army, the Police, the local government authorities and the motoring organizations, without which it would be impossible to move the hundreds of thousands of people and tens of thousands of cars which travel to Farnborough over the seven days of the Display.

The problem is not a simple one in the present state of the road system serving Farnborough. We are still hoping, for one thing, that the Staines by-pass will materialize before the guided weapon and the rocket have taken over completely from the manned aircraft and the last of the S.B.A.C. Flying Displays in their present form is over.

London, S.W.1. EDWARD BOWYER,
Director, The Society of British Aircraft Constructors, Ltd.

Starting Young

IN the paragraph introducing Mr. J. Pollitt, Armstrong Siddeley's new test pilot (*Flight*, September 21), you stated that he became the youngest pilot ever to be accepted for an instructor's course at C.F.S. Unfortunately you did not state at what age that was; but purely as a matter of possible interest, I would like to point out that A/P/O. Osborne Young and myself were both accepted for C.F.S. before our nineteenth birthdays. We were then pupils at No. 8 F.T.S. Montrose. On January 26, 1939, I had a test in Hart (T) K4955 by S/L. Legge (the then C.F.I. at No. 8 F.T.S.) to assess my suitability to go to C.F.S. I was nineteen on February 28, 1939.

Osborne Young subsequently served as an instructor at No. 4 F.T.S. Habbaniya, gaining a D.F.C. in the rebellion, and afterwards as P.A. to A.V-M. H. V. Champion-de-Crespigny.

R.N.A.S. Eglinton, Co. Derry, N.I. B. H. A. PLAYFORD.

[Our paragraph about Mr. Pollitt stated: "He joined the R.A.F. at 17 and became the youngest pilot ever to be accepted for a Central Flying School Course; a year later he became the youngest staff instructor at the C.F.S. itself."—Ed.]

Princesses and Britannias

THE brilliant progress in design and production of British aero engines prompts the question: Have we still no engine powerful enough for the Princess? The story was that the completed airframes must await suitable powerplants. Can we still not put these fine aircraft into service?

This also prompts the reflection that it would be a good thing if Britannias could relieve Elizabethans on some European services, until a cure for their trouble at the 20,000ft inter-tropical freezing level has been found.

London, W.8. HUGH WILSON.

[The three Princesses are at present in Cocoons—two at Calshot and one at Cowes—awaiting a decision on their future by their owner, the Ministry of Supply. Saro have published estimated data for the aircraft fitted with six Bristol Orion turboprops and such engines could probably be fitted within three years.—Ed.]

Rare Bird

SEEN over Southampton on September 30—a U.S. Navy Martin P4M-1 Mercator. Can any other reader claim sighting this rare bird?

Totton, Hants. Ch/Obs. N. R. YATES.

Tonnage Preferred

CONSIDERING the almost incredible progress that has been made since the days of the early wood and fabric aeroplanes, surely we have now reached an era when the practice of weighing large aircraft in *pounds* should give way to the larger and more convenient *ton* units.

Imagine the mental effort involved if the weight of the *Queen Mary*, for instance, were quoted as 179,200,000 lb—not assuming, of course, that aircraft are at all likely to be quite so large for some years to come!

Bramhall, Ches. G. MCL. BROWN.

FORTHCOMING EVENTS

Oct.	16.	Institute of Navigation: A.G.M. and Presidential Address: "The Place of Navigation in Modern Air Transport," by Captain A. M. A. Majendie.
Oct.	17.	Aircraft Recognition Society: Lecture by C. Nepean Bishop.
Oct.	17.	Kronfeld Club: Film Show.
Oct.	17.	R.Ae.S.: Main Lecture: "Importance of Time in Aircraft Manufacture," by A.Cdre F. R. Banks, C.B., O.B.E., F.R.Ae.S.
Oct.	23.	R.Ae.S.: Section Discussion: "Functional Efficiency of Aircraft," introduced by C. Abell, O.B.E., F.R.Ae.S., and A. V-M. A. F. Hutton, C.B., C.B.E., D.F.C.
Oct.	25-26.	Aircraft Electrical Society: Annual Display, Los Angeles.
Oct.	26.	College of Aeronautics: Tenth Anniversary Dinner, London.
Oct.	30.	R.Ae.S.: Graduates and Students Section: "Nuclear Power for Aircraft," by E. P. Hawthorne.
Oct.	31.	Institute of Welding: Annual Dinner.
Nov.	1-2.	Institute of Welding: Joint Meeting with the Netherlands Welding Society.
Nov.	6.	R.Ae.S.: Main Lecture: "London Airport," by Air Marshal Sir John D'Albiac, K.B.E., C.B., D.S.O.
Nov.	9-10.	Agricultural Aviation Show, Palmerston North, New Zealand.

R.Ae.S. Branch Fixtures (to October 22).

Oct. 17, *Coventry*, "Problems Associated with Production and Use of Wrought Aluminium Alloys," by G. Forrest and K. Gunn. Oct. 22, *Glasgow*, "Development of the Jet Propulsion Gas Turbine," by G. C. R. Mathieson.

THE INDUSTRY

Resinated Glass-fabric Tubing

A NEW material for use in aircraft and for aircraft production is "Nu-glas" resinated glass fabric. Tough, stable and light, it is manufactured in tubes of various diameters and wall thicknesses by Ogden Smiths and Hussey, Ltd., of 14-15 Dingwall Road, Croydon, Surrey. (The company's name will be well known to anglers; it was for fishing rods that "Nu-glas" was first used.)

The tubing is produced by treating glass-cloth of unidirectional weave in resin substances, winding it on to tapered mandrels and curing by the application of heat. The resins used—known as epoxy, epoxy-phenolic or polyester—give a very powerful bonding action that contributes largely to the mechanical properties which are claimed for the completed tubing. Although only half the weight of aluminium tubing of similar volume, the dimensional stability of the material is similar to that of mild steel, and chemical resistance and electrical insulation properties are stated to be high. It is also stated that the range of temperatures encountered in aircraft applications (often the stumbling block of processed materials) have practically no effect on the characteristics of "Nu-glas"; the tensile strength—which varies slightly with the resin used—is about 27,000 lb/sq in to 33,000 lb/sq in. A good range of internal diameters between $\frac{1}{4}$in and 4in is available and the tubes are manufactured in lengths up to 3ft in the smaller sizes and 4ft for bores greater than $\frac{1}{4}$in; but it is possible to extend these lengths by a mitred joint which is bandaged with glass fabric and resinated by brushing. An alternative method is to use a resin-clay, glass-strand putty which will set hard in four hours.

Apart from obvious uses of "Nu-glas" in aircraft electrical applications as tubular insulators or as cable conduit, a very wide range of application in the bracing of plastic models, very light scaffolding, spotting racks, drill and welding jigs and aperture-checking fixtures has been made. The range of usefulness can be considerably extended by forming the tubing into various curved shapes, and the manufacturers supply spirally sawn—and hence highly flexible—tubes for this purpose. Once in place they can be firmly set with the aid of the putty or glasscloth strip used to lock the mitred joints. In addition to hand-forming of this nature, it is quite possible to machine the material; parting-off can be done with a normal hacksaw, although the manufacturers warn that the toughness of resinated glass will require frequent replacement of the hacksaw blades; a flexible wheel would normally be used for quantity work. For the same reason, tipped tools and carefully chosen cutting speeds—about 3,000

r.p.m. or 375ft per minute—must be used for machining, and the tool will require frequent sharpening. A good smooth surface can be provided by sanding and finishing; the tubing can be supplied with a sanded-off finish if required. Vickers-Armstrongs and Folland are among firms mentioned as users of "Nu-Glas" for various purposes.

New Dunlop Dynamometer

AT Coventry on October 2 the Dunlop Rubber Co., Ltd., aviation division gave a "private view" of their new dynamometer to a group of technical journalists, and in two demonstration tests showed its impressive capabilities for putting aircraft tyres, wheels and brakes through their paces.

Each test simulated a normal braked landing run. The first was of a well-established brake design, of the two-cylinder, two-plate type incorporating chromium-plated copper plates. This was tested at a landing wheel load of 13,500 lb, a "brakes-on" speed of 127 m.p.h., with a kinetic energy of 6,450,000 foot pounds, and a tyre, wheel and brake volume of 6½ cu ft.

It was very instructive to compare this test with the second, which demonstrated even more strikingly the dynamometer's potentialities. In this case one of the latest designs was used as a "model," a multi-cylinder, two-plate brake employing inorganic linings and steel plates. (Together with a narrow tyre and wheel section, this compact unit has been developed for retracting into the thin wing of a supersonic aircraft.)

Relevant figures from the second test made an interesting comparison with the first. For here, though the wheel load was lighter (13,200 lb), the brakes-on speed was considerably higher at 157 m.p.h. And while the k.e. was much greater—10,000,000 foot pounds—the volume of tyre, wheel and brake had been decreased to 2¾ cu ft.

The dynamometer consists, basically, of a large inertia flywheel of variable weight, with horizontally movable carriages mounted on either side. A tyre, wheel and brake assembly is attached to one of the carriages and brought into contact with the wheel, which is driven by a 400 h.p. D.C. motor and at the maximum 560 r.p.m. achieves an equivalent of 200 m.p.h.

The dynamometer installed at the Coventry works of the Dunlop Rubber Co., Ltd. (see accompanying description), following the testing run of a wheel and brake unit.

As the maximum k.e. value developed by the machine at full flywheel weight and r.p.m. is 66 million ft lb, it is clear that the dynamometer has sufficient capacity to meet the greater braking loads which may be required in the future, particularly for landings and the rejected take-off by high speed aircraft.

The Coventry dynamometer, in the words of a company spokesman at the demonstration, "will enable Dunlops to meet all international test requirements." The whole assembly, which weighs approximately 160 tons, has cost "well over £100,000." It is of American design and took two years to construct.

IN BRIEF

Mr. J. W. Howlett has relinquished the office of chairman and managing director of Wellworthy, Ltd., a subsidiary of Associated Engineering Holdings, Ltd., but remains on the Board. Mr. A. J. Woolcott has been appointed chairman and managing director of Wellworthy, Ltd.

* * *

Mr. C. R. D. Tuckey, general sales manager of British Timken, Ltd., is visiting British East Africa, Rhodesia, South Africa, Australia, New Zealand and Canada on his third world tour. These countries provide some of the principal markets for British Timken products.

* * *

The plastics division of Saro Laminated Wood Products, Ltd., Folly Works, Whippingham, East Cowes, Isle of Wight, has produced a handsome brochure describing its work in the field of reinforced plastics, which have achieved widespread application in the aircraft industry.

* * *

The Institute of Welding, 2 Buckingham Palace Gardens, Buckingham Palace Road, London, S.W.1, has just published a booklet entitled *Health and Safety in Welding*. This is available at 2s per copy (1s 6d for 20 copies or more), for members; or 3s per copy (2s for 20 or more), for non-members, all prices including postage.

* * *

Mr. Alan R. Turner has been appointed western projects engineer for the Photographic Survey Corporation, Ltd., and its new engineering associate, Hunting Technical Services, Ltd., of Toronto. Previously assistant to the manager of the Western Division of P.S.C. at Vancouver, Mr. Turner will now be based in Calgary.

* * *

T.C. Spray Finishing Systems, 5 St. James's Place, London, S.W.1, announce that sales and service facilities for S.F.S. Bede "Econ-o-Matic" paint heaters have been augmented in various parts of the country. A leaflet is available describing the heaters, for which T.C. Spray Finishing Systems have sole manufacturing and distributing rights in this country, the Commonwealth, and certain European territories.

* * *

The Compoflex Co., Ltd., has decided to extend its range of metallic flexibles to include light and heavy flexible cable transmissions of the push-pull and spring-return types, and also speedometer and tachometer cables. Plant has been installed at the factory in Huddersfield Road, Oldham, Lancs, to give an initial production capacity of over 10,000 assemblies a week. Meanwhile the company's Flexibles Advisory Service at 23-25 Northumberland Avenue, London, W.C.2, has published a comprehensive catalogue on light and heavy spring-return types of flexible cable controls.

* * *

In connection with a reconstruction scheme being undertaken by Brymbo Steel Works, Ltd., near Wrexham (a subsidiary company of Guest, Keen and Nettlefolds, Ltd.), orders have been placed for three 40-ton Birlec Lectromelt arc furnaces at a total cost exceeding £300,000. The furnaces are to replace the company's existing open hearth plant.

* * *

A new type of reducing valve, the PS. 64, has been added to the range of those already manufactured by the Hymatic Engineering Co., Ltd., Glover Street, Redditch, Worcs. The PS. 64 reduces inlet pressures of between 150 and 3,000 lb/sq in to 10in w.g. and controls this outlet pressure to within ± 3in w.g. at all flows up to 90 cu ft/min. It weighs 2.72 lb and can also be used over the same inlet range to give outlet pressure up to 10½ lb/sq in.

* * *

A new British Standard, B.S. G.152, specifies requirements for the general and detailed construction and for the accuracy of electrically operated artificial horizons; it also includes information on testing. This standard replaces that part of B.S. G.110 relating to electrically driven instruments; an up-to-date specification to replace requirements of that standard relating to air-driven instruments will be published shortly. Copies of G.152 may be obtained from the B.S.I. Sales Branch, 2 Park Street, London, W.1, price 3s 6d.

* * *

Several new appointments within the Northern Aluminium Co., Ltd., sales department have been announced. Mr. D. W. Taylor, formerly assistant manager of the sales development division, has succeeded Mr. G. A. Vernon, who has retired, as head of the Birmingham area sales office. Mr. D. A. Pinn, previously in charge of the Bristol sales office, has been appointed export sales manager and is succeeded at Bristol by Mr. H. M. Louch, from whom Mr. H. Q. Lievesley takes over management of the Leeds area sales office. At Southampton, Mr. D. L. Roper becomes manager of the regional office with effect from October 1, in succession to Mr. N. P. Campbell, who is to attend a year's course at the Centre d'Etudes Industrielles, Geneva.

Assembly of a Javelin Junction box at Plessey. Photograph by courtesy of the "Times Review of Industry."

Yet another example of The Plessey Company's specialised capacity for the production of Aircraft preformed wiring. This is but one aspect of Plessey Service to the aircraft industry.

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Ahead of the present — — abreast of the future

AP323-14

The first Lockheed 1049H passenger-cargo Super Constellation, the Qantas "Southern Spray," emerges from the assembly lines at Burbank. Delivery to Australia by air is expected to take place on October 15.

CIVIL AVIATION

STRONG WORDS AT SOUTHEND

IF there is one aviation problem that stands thousands of feet above the others, it is, of course, the problem of air traffic control. So many pens have gushed so many torrents of words on this subject that those not directly concerned are becoming a little bored. The impatient question "Why doesn't someone *do* something?" helps no one. A great deal has been and is being done, notably in the laboratories of the electronics industry; but it rests with the users and the controllers of the air first to specify and agree upon their objectives. Those who believe that these objectives can easily be agreed upon by discussion and compromise should have attended the first convention of the Guild of Air Traffic Control Officers at Southend on October 4 and 5.

This meeting really hammered home the seriousness of the A.T.C. situation in this country. The problem in the United States can no longer be regarded as one which the United Kingdom will sooner or later have to face: it is upon us now, and the report and recommendations of the Guild's technical committee (a synopsis appears on page 620) is, in our view, a document of fundamental importance. As a new association (see *Flight*, November 19, 1954) the Guild is naturally sensitive to accusations of presumption and pessimistic gloom-mongering. This humbleness, we feel, is misplaced. There can be no others better qualified to diagnose and prescribe remedies for the run-down condition of the country's A.T.C. system than those who administer it every day.

The two-day conference (the Guild's first) was in many ways a model of its kind. It was attended by about 70 members, as well as representatives of the trade and the users. The business, though sombre in subject, was light in presentation (it was pleasantly leavened by the social side, in which the Mayor of Southend—the Guild's host—cheerily figured). The programme was devised to give everyone concerned with the A.T.C.—users, equipment-suppliers and controllers—an opportunity to present their points of view. The idea of having quiz-teams to answer delegates' questions was excellent, and one that might well add to the value of (and brighten up) other technical conferences.

In addition to the Guild's paper referred to above, two others were presented. The first was by Capt. H. C. Bailey, who, as a senior B.E.A. Viscount captain, put forward the civil pilots' view of air traffic control. The second paper, on the subject of military air traffic control in the United Kingdom, was presented by G/C. F. Hume, deputy director of operations at the Air Ministry.

We shall say more in our next issue of the contents of these papers, of the lively discussions which followed them, and of the two "Any Questions" sessions. [Editorial comment: page 599.]

BRITANNIAS FOR NORTHEAST?

FIVE weeks after the Britannia's American tour came a foretaste of the fruits of Bristol's sales policy. Although at the time of going to press Northeast had yet to sign the initial contract, negotiations for the supply of five Britannia 305s (worth, it is said, about £6m) to the U.S. domestic carrier were well advanced and might have been completed but for a premature publication of the announcement.

To Northeast, delivery of the aircraft in the autumn of 1957 (made possible by B.O.A.C., who have agreed to relinquish their first five 305s in place of more 312s in 1958) would be of considerable importance. Only very recently granted by the Civil Aeronautics Board a third share in what has been described as the "richest traffic plum in America"—the New York-Miami route (see *Flight*, August 31)—the airline would, in its turboprop Britannia, have a year's lead over its competitors (Eastern and National), whose first Electras are not scheduled for delivery until August 1958.

The richness of the New York-Miami plum is best illustrated by a simple comparison: whereas five airlines share the important New York-Chicago route, the 1,000 n.m. stage between New York and Miami, which books about 29 per cent more passengers (a total of 763,000 in 1955) has been apportioned by the C.A.B. among only three carriers.

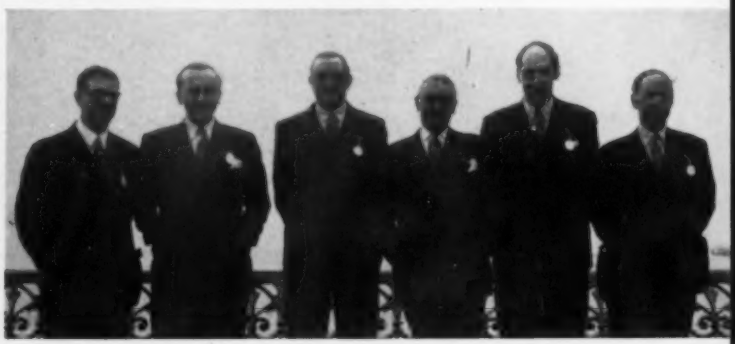
Northeast's Miami service would be operated by Britannias in a 90-seat configuration. In the reported words of Mr. George E. Gardner, the airline's president, "the Britannia is the ideal aeroplane for the de luxe first-class service we are planning to offer."

More details of the Britannia's North American tour are contained in a report which Bristol entitle "Operation Clockwork." A summary of cold facts, the report manages to convey eloquently the regularity and reliability of the aircraft (G-ANBJ) during its 19 day—78 hr. 58 min airborne time—demonstration trip. "Baker Jig" (Bravo Juliet?) had flown merely 16 hr 10 min when it left for America a week after its completion; yet only two delays—one lasting two hours due to a piece of grit holding open a shuttle valve in the undercarriage emergency lowering mechanism, and another of one hour due to the shearing of a starter motor quill-shaft—occurred during the 32 demonstration flights and 52 take-offs and landings which were made. Such other maintenance snags as occurred were rapidly dealt with by the Bristol technical staff. At San Francisco, United Air Lines engineers were impressed with the way a necessary throttle motor change was made in 12 minutes. Shortly afterwards U.A.L. "sent over their chief engineers and they gave the maintenance team a real grilling." Editorial comment appears on page 599.

Footnote: From *Aviation Week*, October 1, page 38: ". . . the British are still a potent factor in the competition for turbine transport sales . . ."

Eagle Aviation's elegant central London terminal at Marble Arch House was opened on October 1 by Mr. J. Profumo, Parliamentary Secretary to the Ministry of Transport and Civil Aviation.

Officials of the Guild of Air Traffic Control Officers (see Col. 1): l. to r.: Mr. B. F. Collins; Mr. H. S. C. Rigby; W/C. G. E. Lillywhite; Mr. E. Vincent Miller (Master); Mr. S. G. Fitch; Mr. C. A. M. Kyrke-Smith.



To add commercial interest to this fine study of the Fokker Friendship is the recent announcement of a $1,300,000 order for two Fairchild-built aircraft (with an option on two more) from the Canadian airline, Quebecair.

CIVIL AVIATION...

FAST MERCHANTMAN

BREAKING records and establishing fastest-yet city-to-city times is becoming a familiar feature of the development of jet aircraft as they reach the proving flight stage. France's Caravelle is no exception. On October 3, one of two Caravelles now being used by Air France for proving trials, flew from Paris to Nice in one hour and eighteen minutes, thus establishing a new record for commercial aircraft on a route which has always had a certain romantic appeal for record breaking. Among the passengers on the test flight were the president, M. Max Hymans, and other high officials of Air France. Although the direct distance is 420 miles, the Caravelle covered a greater distance by making a detour over the Alps; at 30,000ft it is reported to have reached 484 m.p.h. It is to go into service on European and African routes at the end of 1958, according to M. Lesieux, the airline's director-general.

The aircraft was recently demonstrated to Col. Luis Galvez, the director of Venezuelan civil aviation. After flying the aircraft from Paris to Amsterdam Col. Galvez said: "It seems exactly what we need for some of our Caribbean flights and the link with Miami. I will make a very favourable report."

AIRPORT BEHAVIOUR OF THE 707

SOME details of the tests to which the Boeing 707 was subjected by Mr. James Pyle (see last week's issue) during his study of its traffic pattern behaviour is contained in a preliminary report of the findings issued by the U.S. Department of Commerce. The department stated that the aircraft's speed ranged from 585 m.p.h. cruising at 35,000ft down to a stalling speed of 116 m.p.h. "It easily demonstrated its controllability at 180 m.p.h., which is the limit C.A.A. applied in the experimental high density air traffic control zone, and it should, therefore, mix readily with conventional aircraft when it descends to their altitudes at airports." The aircraft was also put through a normal descent of 4,000ft/min, and a simulated emergency descent of 14,000ft/min using speed brakes. "The ability of the aircraft to descend rapidly without passenger discomfort," the report continued, "should permit the C.A.A. controllers to feed it readily into a final approach from the holding pattern offset to one side." Another test which was concluded satisfactorily was a turn-off from the runway at a 30 degree angle, while moving at well over 70 m.p.h., on a surface, which was stated to be "less smooth than a standard taxiway."

Commenting upon the series of instrument landing approaches that were undertaken, the report described the pilot's deliberate action of entering the glide path too far to the right of the centreline. "He was able to avoid a missed approach by making an S-turn to correct the lateral error," it stated. "On the next approach, the pilot deliberately arrived at the middle marker too high, but by the use of spoilers was able to lose the necessary amount of altitude rapidly, and come in on glide path. The plane's manœuvrability under these conditions suggests that it will experience less missed approaches than conventional aircraft, and to that extent reduce air traffic delays at airports."

STREAMLINING THE PAPERWORK

TO speed-up their reservations systems, T.W.A. have ordered a number of electronic reservation "Magnetronic Reservisors" to record the number of seats available in the ensuing 31 days on their domestic flights and six months on their international services. Intended to be employed very extensively by their reservation agents, the equipment will consist of counter-top "agent sets" and three "brain centres" for data-storage located at New York, Chicago and Los Angeles. Operation of the agent sets is by a system of push buttons and coloured lights for checking available accommodation, and moving a small lever on the set enables the agent to inform the central reservations office at Kansas City of a sale or cancellation. When a flight is sold out the reservations office adjusts the three brain centres to indicate "no space available." This information is sent by ordinary teletype, but reading and recording are greatly speeded up by the magnetronic system.

The size of Great Britain's airline reservation problem may be judged from a recent statement by Mr. R. Lorimer Weir (the financial controller of B.E.A.). At its busiest time, he said, B.E.A. alone have at least a million reservations on hand and electronic computers with a large memory capacity similar to those in use in the United States are also required by his Corporation.

ARMCHAIR PILOTS

DISSATISFACTION with the capabilities of the ANT-18 Link trainer used by B.O.A.C. several years ago spurred a small team of B.O.A.C. Link and simulator engineers to build an experimental analogue computer which, coupled to a Link trainer fuselage, simulated the characteristics of a Comet 1. Later, roll and yaw terms (and a change of fuselage and performance parameters to represent the Constellation 749A) were added and the computer became the first B.O.A.C. flight trainer. It proved so successful that B.O.A.C. authorized the construction of further trainers to represent the Britannia 102 and 312, DC-7C, Argonaut and the Comet 4. These have been entirely designed and built by the Corporation's Central Training Unit under the supervision of Mr. A. H. Stewart, the senior radio instructor.

By designing a universal engine—which provides fifty different power configurations selected by push buttons—and standardizing as many other units as possible, 80 per cent of the computer can be built without reference to a specific aircraft. Although control in three axes is computed, the simulator pivots in pitch only about a point some three feet behind the pilot; it is claimed that this gives a more realistic feeling of being airborne than is present in a full simulator. To reduce the size and increase the simplicity of the trainer only two-thirds of the instrument panel is reproduced and the functions of the co-pilot—such as operation of the throttles—are reproduced by the instructor, who replies to the pilot's orders through a cockpit loudspeaker.

Faithful reproduction can be made of the performance of a particular aircraft in most aspects of normal, three or even two-engined flight and the appropriate control loadings applicable

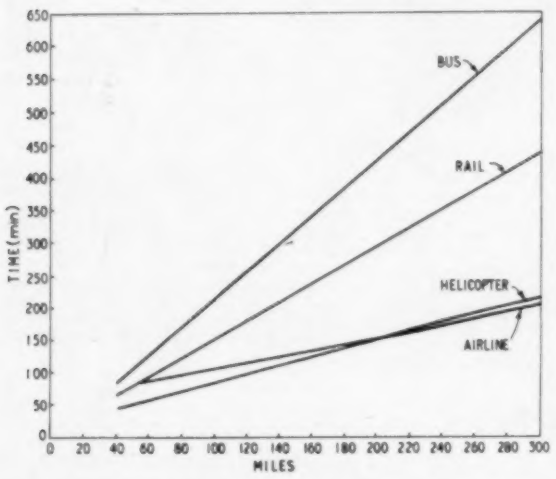
An instructor and pilot run through the check list on a B.O.A.C. flight trainer which was designed and built by members of the B.O.A.C.'s Central Training Unit.

to the changed airspeed and to asymmetric thrust will be felt at the control column. In addition, the simulator is sufficiently comprehensive to show most of the items on the check list, so that the full work load of the aircraft is imposed on the pilot in a simulated emergency or during procedure practice. Radio aids such as V.O.R., A.D.F., D.M.E., I.L.S. or Radio Range are provided by modifying Link units and the track flown is plotted on an ordinary Link table.

The work of B.O.A.C.'s senior simulator engineer, Mr. David Walker, and the Central Training Unit in devising the relatively simple analogue computer upon which trainers are based recently received tangible awards for their enterprise—in the form of quite substantial cheques from B.O.A.C.'s suggestions scheme award committee.

WHAT ABOUT HELICOPTERS?

CURRENT doubts about the economic possibilities of helicopters in the next ten years were voiced by Capt. J. W. G. James, flight operations and communications director of B.E.A. in his recent address to the Aerodrome Owners' Association conference. At the moment, Capt. James explained, helicopter operations cost about 20d per passenger seat mile over a 200 mile route, compared to 2¼d for the Viscount; but, he added, "men have always been prepared to spend money to save time and at the moment the saving in time from city centre to city centre could be as high as 50 per cent." Suggesting that helicopter operations would be on a better footing when 40-50 seat machines were available, Capt. James advised local authorities to assess the volume of traffic and the cost and convenience of a helicopter service before deciding upon the construction of a heliport.



A very thorough study, the results of which are given above, has been carried out by the Port of New York Authority. Twenty minutes are added to each time (60 mins for the airlines) to allow for movement of passengers from their point of origin.

Further aid to helicopter progress is to be given by the U.S. Civil Aeronautics Administration, who are planning to make a first-hand study of navigational aids, communications and traffic control problems by actual tests with a helicopter. One line of their research is the investigation of Navy S-58s equipped with automatic stabilizing gear. The Bendix Aviation Corporation are planning the development of helicopter freight and navigation instruments. They have been aided by the studies of the U.S. Stamford Research Institute who have indicated in a report that a system of "area coverage"—providing position information over a wide area without regard to an aircraft's course—was better suited to the needs of helicopter navigation than an air highway system which would restrict a pilot to a predetermined course.

When this S-55 of New York Airways took off from the city's first commercial heliport in Manhattan it inaugurated a regular mail service between West 30th Street and three major New York airports.

ADVENTURE EVERY THURSDAY

AN enterprising (but fictitious) hero of our early schooldays was a youth called Porson, who with considerable affection for his venerable Farman Biplane and a cavalier disregard of cabotage, fare structures, runway strengths or avionic aids, nailed up a board on his shed to announce "Porson's Flying Service—By Air to Anywhere"—and commenced his cross-country operations and sightseeing tours without further formality. The world has shrunk since then. The venturesome must now seek further afield for the enchantment of exploration; but for those with time and bank balance to spare air travel in search of the exotic and mysterious is still available. In keeping with the custom of the present age, these airborne tours run to an itinerary; and the ambitious globe trotter can rely on the services of travel authorities and the aircraft of B.O.A.C., Qantas and Japan Air Lines to complete a heavy programme on schedule.

The first series of tours which have been arranged by the U.S. offices of B.O.A.C., are known as the "Budget Globe Trotter" and have three distinct itineraries. The first is an "Asiatic Adventure" (departing each Thursday from San Francisco, the inclusive charge covering every expense except the passenger's passport, visas and personal expenses) which in 30 days extends from Tokyo through Bangkok and Delhi to Bethlehem and Cairo. Another 30 day tour is the "Trade Winds Tour" to the Fiji Islands, New Zealand, Singapore, India and Egypt and the third itinerary—the "South Seas Tour"—occupies 40 days travelling from San Francisco to Australia by Qantas Super Constellation and from there *via* the Indian Ocean to Mauritius to spend the final 24 days ranging through Africa.

The second tour of the series is an individual and large scale affair lasting for 58 days of sightseeing "Safari" into Africa. The planning of this tour has been arranged by an American travel authority, Dr. William G. Campbell, and it will be led by the president of the World Travel Bureau, Mr. Harry Jackson. The first African stop is Ethiopia; from there the party will go south to Kenya, Zanzibar and Johannesburg and north again to Livingstone, Uganda, Lake Kivu, Entebbe and Egypt. Receptions, ceremonies and tribal dances will be attended by the travellers who will also see the diamond mines at Kimberley, visit the pygmies and analyse the inscrutability of the Sphinx.

The cost of the "budget globe trotters'" tours ranges from £712 to £692 and the price of the African Safari is £891—which seems to be good value for the wealth of experience to be gained and the distances that will be flown. We now anticipate that this experience of wealth will be condensed into our next favourite air-travel book.

Discussing the Viscount and Vanguard during a recent visit to Vickers-Armstrongs at Weybridge were (left to right) Mr. David Sykes, sales department, Vickers; Dr. Bento Ribeiro Dantas, president of Cruzeiro do Sol; Mr. F. L. Duncan, the airline's U.S. representative; and Sr. Carlos Perez, president of Lloyd Aereo Colombiano.

The Czechoslovak pilot Frantisek Novak and the Sokol M.1C in which he set up recent closed-circuit and straight-line distance records. Novak is an instructor at the Brno Aero Club; details of his flights are given below.

CHEAPER BY THE DOZEN

THE social and commercial advantages of using business aircraft to cover long distances in the U.S.A. are very real, but the high costs associated with the relatively low utilization usually obtained are often hardly worthwhile unless the private-owner flies for enjoyment as well. In Burbank, California, a non-profit organization known as the "Sky Roamers" provides —by a system of collective operation—very much cheaper flying for businessmen than would be possible individually.

One of the few American clubs to survive the post-war doldrums, the Sky Roamers now has a membership of 85, and nine Cessna aircraft—two 170s, five 172s, and two 180s—are being operated. It is likely that at least three larger executive aircraft—probably Piper Apaches—will soon be added to the fleet. Membership of the organization is on a closely-controlled basis of financial obligation to the club. Each member becomes a shareholder with a negotiable share of stock based on his class of membership—ranging from £160 for training membership to £1,250 for membership entitling the holder to operate all the light aircraft owned by the club, including the pending twin-engined types. Compared with private ownership, only about one-tenth of the capital outlay need be found; and, by virtue of group maintenance and high utilization, operating costs are halved.

All the aircraft are equipped with up-to-date instruments, navigation and communications aids and safety devices, and the policy of weekend pleasure flying in addition to business flights during the week results in a large number of hours being accumulated—a recent month's average was 75 hours per aircraft. Some planning ahead may be necessary if a specific type of Cessna is required, but the members usually experience no difficulty in getting an aircraft when they need it. Sky Roamers have now flown 28,000 hours ("around the world 140 times") since the pool scheme began.

CZECH-FLIGHTS

THE world distance record for aircraft weighing between 500 and 1,000 kg has been claimed by Czechoslovakia for a flight of 4,400 km (2,734 miles) made by Frantisek Novak on September 20-21. Novak, flying a Sokol M1C, took off from Brno (where he is an aero-club instructor) in Czechoslovakia and landed at Kulunda, U.S.S.R., after a flight lasting 22 hr 12 min. The previous straight-line distance record for this class was of 3,963 km (2,462 miles), set up by the American pilot Max Conrad in a Piper Pacer in 1952.

This is the third record-breaking flight by Novak within the last fifteen months, the earlier two being for closed-circuit distance. In June 1955 he flew 3,116 km (1,948 miles) in the Sokol to gain the closed-circuit distance record in category C.1b (500-1,000 kg); and in August 1956, at a take-off weight of 1,004 kg (carrying 600 litres of fuel) he gained the category C.1c (1,000-1,750 kg) record for a closed-circuit flight of 4,423 km (2,764 miles) in the same aircraft, lasting 22 hr 11 min. The circuit distance was 100.5 km.

ASIAN AGREEMENT

AFTER much patient and delicate negotiation, an agreement was signed in New Delhi on October 1 by India and Ceylon which permits Air Ceylon to operate into and out of Bombay airport and to pick up passengers there—a cabotage right which had been denied to the airline since access to Bombay was refused by India in June. The bone of contention was the financial interest of K.L.M. in Air Ceylon. India insisted that since the majority of the K.L.M.-Air Ceylon combine shares were held by the Dutch airlines, Air Ceylon did not have full control of the combine and was not, under the existing combine agreement, permitted to operate services.

BREVITIES

OPENING Eagle Aviation's London terminal (see p. 625) Mr. J. Profumo, Parliamentary Secretary to the M.T.C.A., announced that the second stage of a plan designed to simplify the trans-shipment of freight to and from London Airport was put into operation on October 1.

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A new 2,000-yd landing strip was opened last month by President Carlos Ibanez at Arica airport in Chile.

* * *

The supplies manager of B.O.A.C., Sir William Cushion, retired recently after being with the Corporation for ten years.

* * *

Eighteen airlines operating in New York State have agreed to employ Negroes as pilots or other members of their crews.

* * *

The Israeli Government has asked that the new reduced-rate fares across the Atlantic be extended in validity from 15 to 17 days in order to give tourists reasonable time to visit Israel.

* * *

Deutsche Lufthansa (West Germany) is threatening to take legal action against the Soviet Zone Lufthansa unless the use of its name and emblems is restricted to the East Zone of Germany.

* * *

Mr. Sherman Fairchild, founder and director of Fairchild Engines and Airplane Corporation, has resigned from the board of Pan American as a result of C.A.B. refusal to approve his directorships in both corporations.

* * *

More than 11,500 passengers have been carried by helicopter between Rotterdam and Brussels. New services between Rotterdam and Paris and to Luxemburg, Saarbrucken, the Hague and Amsterdam may soon be flown by Sabena machines.

It is reported from Peking that the sixth new airline this year has been opened in China.

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The East-German Lufthansa opened a service between Berlin and Moscow on October 7.

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An agreement for the establishment of regular commercial air services between Egypt and Saudi Arabia was signed in Cairo recently.

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Members of the Russian Olympic team will fly part of the way to Melbourne in the Tu-104. Lt-Gen. Zakharov, Russia's vice-chief of civil aviation, announced that a "new jet plane designed to carry 180 passengers" is being "rushed to completion."

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The Czechoslovak radio network reports that Czechoslovak Airlines are to extend their Prague-Belgrade service to Albania and open a new service to Cairo. Aeroflot will put the Tu-104 into regular service on the Moscow-Prague route this month.

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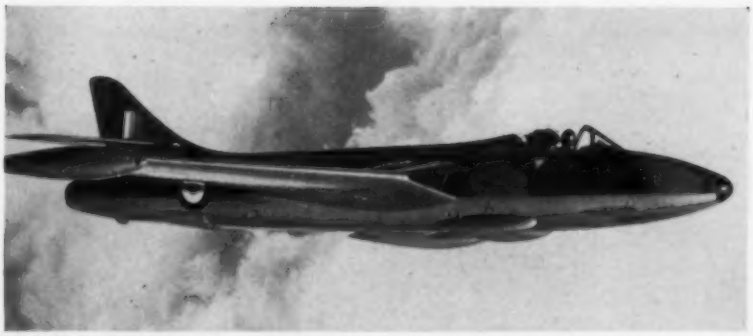
Bournemouth (Hurn) Airport Advisory Committee, who estimate that 23,000 passengers a year will use the airport by 1959, are to complain to the M.T.C.A. about the lack of available passenger facilities.

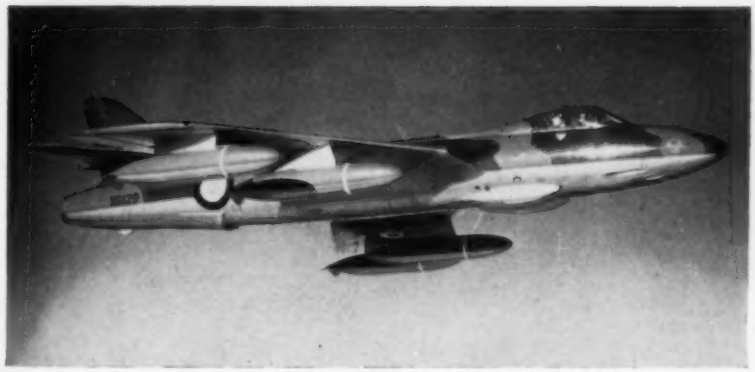
* * *

Eight passengers and the pilot, Mr. John Davies, escaped from a D.H. Rapide of Don Everall Aviation following a forced landing in a Warwickshire field after an engine failure on a flight from Paris to Birmingham. Three were slightly injured; the aircraft was burned out.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News





Two of the mounts from Hawker's Hunter stable illustrated in formation on page 601. Uppermost is the tip-tanked F.6 and below it the F.6 with four plastic 100-gal underwing tanks.

The Last Lancaster

ON Monday the R.A.F. will bid farewell to its last operational Lancaster, when the machine leaves the Coastal Command station at St. Mawgan, Cornwall, to be broken up.

During their 15 years' service, Lancasters flew 156,000 sorties against Germany and dropped 608,612 tons of high-explosive bombs and 51½ million incendiaries in every kind of attack. In recent years they have served mostly in Coastal Command. Lancasters ceased to operate as front-line bombers in 1950, although a survey squadron of them was retained in Bomber Command until 1953. In Coastal Command they were used mainly for training, and have now been replaced by Shackletons. The Lancaster first went into service with No. 44 (Rhodesia) Squadron in September 1941. The first operation was mine-laying in the Heligoland Bight in March 1942.

Winterization Trials

TWO Valiants and two Canberras are being sent to the cold weather test establishment at Namao in Canada to spend the winter there. Their crews will gain experience in flying and navigating in northern Canadian regions, and ground crews will learn winter maintenance techniques. During the winter the aircraft are to be brought back once to England for overhaul.

Sir Hugh Saunders Honoured

LAST week Air Chief Marshal Sir Hugh Saunders was invested in London with the Grand Cross of Dannebrog, conferred on him by the King of Denmark in recognition of his services as adviser to the Danish air force during the last two years. The investiture was made by the Danish Chargé d'Affaires in London. Sir Hugh was recently appointed chief co-ordinator of Anglo-American hospitality activities in Britain, in succession to Air Chief Marshal Sir John Whitworth Jones.

Mid-Canada Line Airlift

PART of the Royal Canadian Navy's only helicopter anti-submarine squadron, HS-50, has been withdrawn from coming sea exercises in the Bermuda area to assist in the airlift of equipment to Mid-Canada Line early warning sites in the Labrador area. Six S-55s were relieved of their dunking sonar equipment and flown 850 miles from Shearwater to Knob Lake, their airlift operating base.

L. G. Groves Memorial Prizes

THIS year's winners of the L. G. Groves Memorial prizes and award have now been announced. The prize for aircraft safety has been awarded to W/C. F. Latham of the R.A.F. Institute of Aviation Medicine. The prize for meteorology was won by Mr. F. H. Bushby, senior scientific officer of the Meteorological Office at Dunstable. The award for air meteorological observers has gone to F/Sgt. J. D. Moyes of R.A.F. Aldergrove, Northern Ireland.

W/C. Latham has carried out research into the physiological factors involved in abandoning aircraft, with particular reference to the effects of explosive ejection on the human body. Mr. Bushby is a member of the forecasting research team of the Napier Shaw laboratory at Dunstable and has worked with marked success on dynamical problems, and especially on the application of equations of fluid dynamics to forecasting, using electronic computing machines. F/Sgt. Moyes received this year's award for meritorious work while serving as an air signaller on meteorological duties with No. 202 Sqn. based at Aldergrove, Northern Ireland.

Queen's Flight Change

THE Commanding Officer of the Queen's Flight and the Queen's personal pilot, G/C. J. E. Grindon, has been appointed to command R.A.F. Honington in place of G/C. Clayton, who is taking up an appointment with S.H.A.P.E.

S.E.A.T.O. Exercise

JET fighters, Lincoln bombers and Sunderland flying boats of the British Far East Air Force took part in a week-long S.E.A.T.O. air/sea exercise from September 27 to October 3, which took place over areas of the Java and South China Seas, the Gulf of Thailand and shipping lanes between Bangkok and Hong Kong. A task of the Lincolns was to attack the fleet, which comprised units of all S.E.A.T.O. nations except France; the Sunderlands supported a cruiser attack against a convoy; and jet fighters of the R.A.F. and R.N.Z.A.F. defended Singapore against carrier-borne aircraft of the Royal Australian Navy. Commonwealth aircraft were joined later in the exercise by squadrons from the Royal Thai Air Force and the U.S.A.F.

The Thai aircraft had two opportunities of exercising their attacking forces against the fleet, and on October 8 the city of Bangkok was to see a fly-past of aircraft from the Royal Australian Navy carriers.

St. Clement Danes Concert

IN aid of the rebuilding of the Royal Air Force Church of St. Clement Danes, London, a concert will be held at the Lyceum Theatre on Monday, November 26, at 8 p.m., at which H.R.H. The Duchess of Gloucester will be present. The programme will be played by The Central Band of the Royal Air Force, under its conductor W/C. A. E. Sims, O.B.E., and soloists are such well-known musicians as Constance Shacklock, Cecelia Keating, Leon Goossens, Joseph Cooper and Inia Te Wiata.

Wind Tunnel for Henlow

A NEW high-speed wind tunnel, capable of operation at supersonic speeds, has been acquired by the R.A.F. Technical College, Henlow, through the generosity of Sir William Farren, Technical Director of A. V. Roe and Co., Ltd. The tunnel was originally a pilot model for a larger installation and is to be reassembled in the projected aero-thermodynamics laboratory at Henlow. It is hoped to have it in operation next year.

R.A.F. Reserves Ball

SOME tickets are still available for the R.A.F. Reserves Ball, to be held at the Dorchester Hotel on October 17, from 7.30 p.m. to 2 a.m. The programme includes dinner, dancing and a cabaret, and tickets (price £2 10s) may be obtained from the secretary, Mr. H. C. Room, 14 South Street, London, W.1.

SERVICE AVIATION . . .

Instruction on Ejector Seats

THE British Red Cross society will, during coming weeks, be distributing a large number of Air Ministry posters with diagrams and instructions on ground safeguards in the handling of ejector seats. Some of the posters show the layout of an ejector seat, while others indicate the ground handling procedure with special reference to a jet bomber. This supplements instruction already given to British Red Cross personnel during visits to R.A.F. stations.

Church at R.A.F. Cosford

OCCUPYING part of a large hangar, the church of St. Michael and All Angels at R.A.F. Cosford contains several historic furnishings. Oldest of these are an altar cross and candlesticks made from the laminated wooden propeller of an aircraft shot down in France during the first world war. The cross was first used for the Easter Day service at Maquise, between Calais and Boulogne, once an R.F.C. depot.

Hanging in the church is a flag of St. George which was in the possession of the present Chaplain-in-Chief of the R.A.F., the Rev. Canon A. S. Giles, throughout the 3½ years he was a prisoner of the Japanese. It was used by the prisoners as an altar cloth and funeral pall.

Other furnishings are the work of a civilian employed in the workshops at Cosford, Mr. H. Onions. These include carved badges of the units which have been based at Cosford, and a pulpit and lectern carved from an oak from the famous Boscobel estate in which King Charles II hid after his defeat by Cromwell at the Battle of Worcester.

Underground Problem

NORTHERN Forces Headquarters have suffered an invasion of moles and opinions are mixed on the welcome which they should be given. A visiting Dutch horticulturist suggested the blue-powder method of removing them, but Major Galwey, secretary of the horticultural club, believes they will improve the condition of the poor soil at headquarters.

R.A.F.A. Continental Tour

LEAVING London last week to visit branches of the Royal Air Forces Association on the continent were Mr. G. R. Boak, general secretary of the association, and W/C. W. H. N. Shakespeare, a member of the association's national council and executive committee. After visits to Brussels, The Hague and Amsterdam, they were due to arrive at H.Q. 2nd T.A.F. From there they would tour R.A.F. stations to visit officers acting in a liaison capacity between the association and the R.A.F., and talk to personnel about the work of the association.

S/Tech. H. Gouge (left) and L.A/C M. McFee tend the flowers round the Spitfire Memorial of the R.A.F. station at Manston, watched by the Station Adjutant, F/L. G. F. Rideout.

Bacterial Corrosion

SEA-WATER infected by bacteria was discovered to be the cause of corrosion of engine parts responsible for the grounding of Canberras in Malaya this year, stated Dr. K. R. Butlin of the Chemical Research Laboratory. Nearly a month of research was necessary before tests on specimens of kerosine flown to England from the 550,000-gal supply tank near R.A.F. Butterworth, Penang, revealed that sea-water lying in the bottom of the tank contained bacteria which formed a corrosive sulphur compound. This led to metallic sulphide deposits on the fuel pumps which eventually rendered them unserviceable.

Dr. Butlin recommended that the use of water bottoms in fuel storage tanks should be prohibited; or, where this was not possible, that a bacteria inhibitor should be used.

Training at Fraser's Hill

AT the top of 4,500ft-high Fraser's Hill, a beauty spot in central Malaya, six R.A.F. men are running a unit which provides two weeks' general service courses for officers, airmen and airwomen. The climate for that part of the world is ideal and recreation amenities are varied and attractive. The courses are extremely popular.

F.E.A.F. Tie

OFFICERS and airmen who have served, or who are serving, with the Far East Air Force can now obtain a F.E.A.F. tie incorporating the command badge in silver on a dark blue background. The badge shows a Chinese junk and two Malayan *krises*.

Appointments

THE following continues a list of Royal Air Force appointments announced by the Air Ministry:—

G/C. G. G. Barrett, C.B.E., to Air Ministry, for duty in the Department of the Chief of Air Staff; G/C. G. B. Blacklock, O.B.E., D.F.C., D.F.M., to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; G/C. J. A. S. Brown to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; G/C. R. T. Frogley, O.B.E., D.F.C., to Air Ministry, for duty in the Department of the Chief of Air Staff; G/C. J. R. Gordon-Finlayson, D.S.O., D.F.C., to H.Q., Bomber Command, for administrative staff duties; G/C. C. R. Lousada to R.A.F. Cardington, to command; G/C. J. E. S. Morton, D.F.C., to the R.A.F. Flying College, Manby, as Chief Instructor and Deputy Commandant; G/C. C. V. D. Willis, D.S.O., O.B.E., D.F.C., to R.A.F. Nuneham Park, Oxon, to command; G/C. N. F. Simpson, O.B.E., to H.Q. Flying Training Command, for air staff duties; G/C. H. P. Johnson, O.B.E., to H.Q. No. 27 Group, for air staff duties; G/C. L. D. Dadswell to Ministry of Supply; G/C. A. H. Garland to Air Ministry, for duty in the Department of the Air Member for Personnel; G/C. K. P. Lewis to Air Ministry, for duty in the Department of the Air Member for Personnel; G/C. W. T. Brooks, D.S.O., D.F.C., to R.A.F. Cranwell, to command (retaining the acting rank of Group Captain); G/C. D. H. Burnside, D.S.O., O.B.E., D.F.C., to A.A.F.C.E., for staff duties; G/C. S. E. MacKenzie, C.B.E., to Air Ministry for duty in the Department of the Air Member for Personnel; G/C. W. G. Oldbury, O.B.E., D.F.C., to H.Q. 2nd T.A.F., for air staff duties; G/C. K. Slater, C.B.E., A.F.C., to R.A.F. Hemswell to command; G/C. P. W. Stansfeld, C.B.E., D.F.C., to R.A.F. Hendon, to command; G/C. D. F. Spotswood, C.B.E., D.S.O., D.F.C., to Air Ministry, for duty in the Department of the Chief of the Air Staff.

W/C. E. P. Wells, D.S.O., D.F.C., to Air Ministry, for duty in the Department of the Chief of the Air Staff; W/C. S. C. V. Chiswell, to R.A.F. Luqa, for technical duties; W/C. J. Fleming, M.B.E., to R.A.F. Wartling, to command; W/C. C. J. Giles, O.B.E., to Ministry of Supply; W/C. D. J. H. Lay, D.S.O., D.F.C., to R.A.F. Hornchurch, as President of the Selection Board; W/C. C. W. McN. Newman, D.F.C., to H.Q. Southern Sector, for air staff duties; W/C. M. K. Sewell, D.F.C., A.F.C., to R.A.F. Bishops Court, to command; W/C. R. W. Williams, to H.Q., 2nd A.T.A.F., for technical staff duties.

Lockheed T-33 assembly line at Burbank, California, inspected by R.A.F. cadets P/O. A. J. Brown and P/O. G. C. Stewart (second and third from left) and two Norwegian Air Force trainees.

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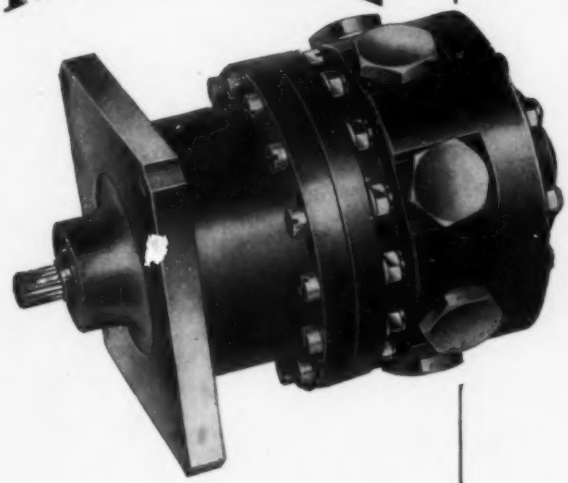

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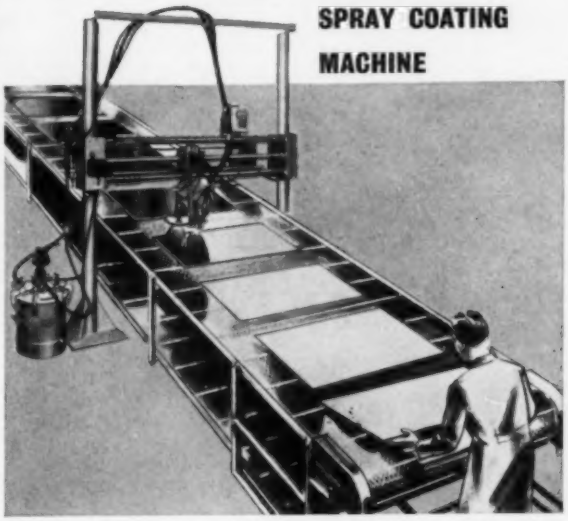

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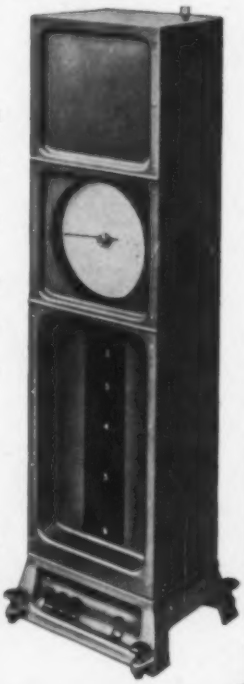

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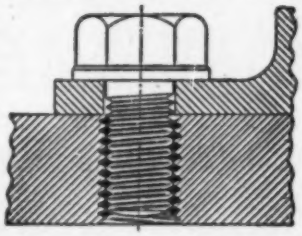

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INITIAL salary to the right man £850 to £1,000.

APPLICATION, quoting T.S. to the Technical Personnel Officer, Armstrong Siddeley Motors Limited, Coventry. [5762

THE following categories of staff are required to work at Stansted Airport.

1.—ENGINE and/or Airframe fitters. Applicants should have had experience on modern four-engined aircraft, preferably Hermes or Yorks.

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require in their

WEAPONS RESEARCH DIVISION

a number of

SENIOR AERODYNAMICISTS

ONE of the selected applicants will be required to be responsible for the Aerodynamic work of the Division.

KNOWLEDGE of weapons is not essential but applicants should have good experience in sub-sonic and super-sonic work, and hold a degree or equivalent.

THE posts offer excellent salaries and prospects on top priority work. Pension and Life Assurance Scheme. Applications should be addressed to the Personnel Manager, Hunting Percival Aircraft Limited, Luton Airport, Beds., quoting Ref. W.R.D./F/6, and giving full details of qualifications, experience, age and salary required. [5764

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APPLICATIONS, quoting E.C.S. to Technical Personnel Manager, Armstrong Siddeley Motors Limited, Coventry. [5761

FLYING INSTRUCTOR required, preferably with jet experience. Apply Box 4490. [5782

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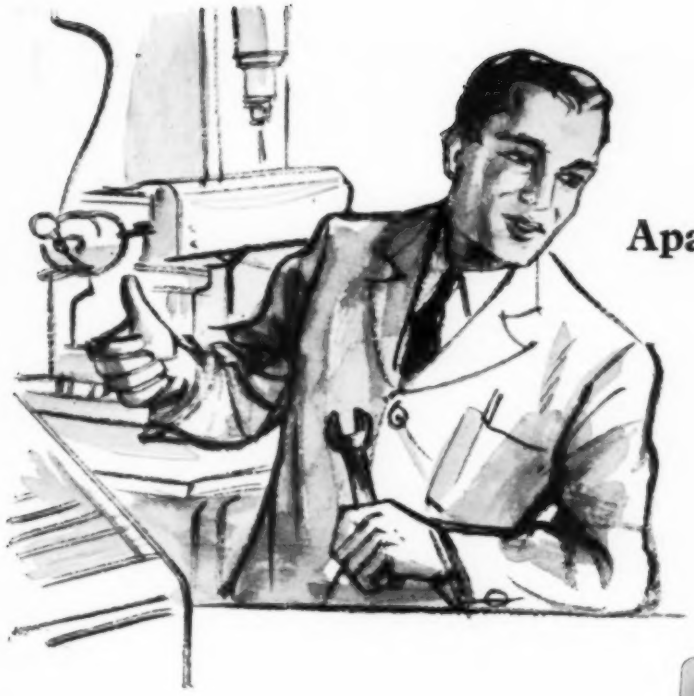

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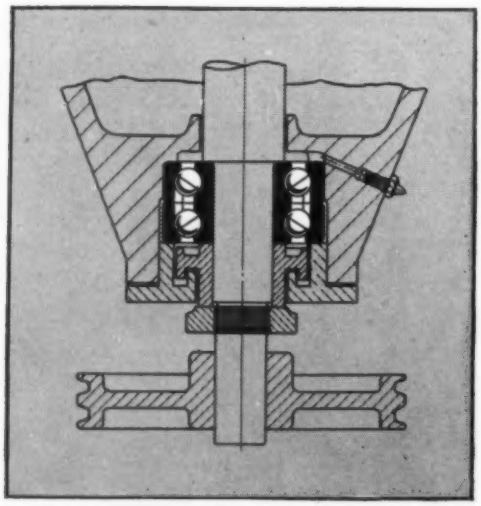

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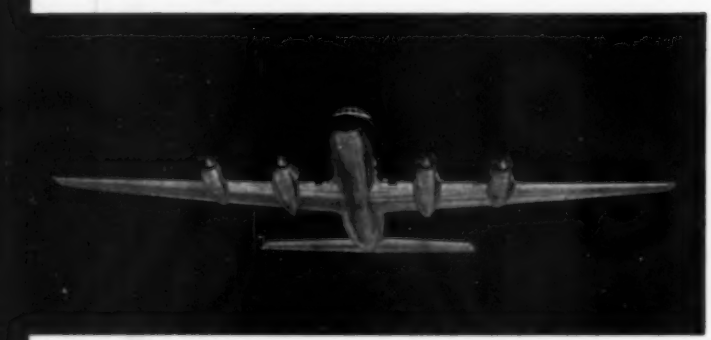

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